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Judge Won't Go

EW YORK — Judge David N. delstein last week denied IBM's request that he remove himself from the trial of the decade-long antitrust suit brought by the government against the firm.

On July 19 IBM asked the judge to remove himself from the case, claiming that he was biased against the firm. The firm filed a 2,000-page, nine-volume petition detailing what it claimed were abuses of the judge's authority in the case.

However, the petition did not charge that the judge's alleged biases were based on extrajudicial origin, which would be necessary for the judge to be removed from the case as it was in progress, the Justice Department claimed.

IBM made the unusual move after several of its directors studied the case in detail after the firm had asked for a special recess in the trial.

The case, filed more than 10 years ago, has been at trial for five years. It was recessed April 20; IBM filed the motion to remove the judge on July 19.

Government attorneys would not comment on the ruling last week. IBM had not seen the documents in the case and would not comment at press time, which was early last week.

User Running MVS On Magnuson M80/4, A 370/148-Class CPU

By Don Leavitt
CW Staff

WALTHAM, Mass. — Although IBM's comprehensive operating system, MVS, is normally considered appropriate only for large-scale systems, a software development firm here recently implemented it on a modestly configured Magnuson Systems Corp. M80/4.

Mitrol, Inc. put MVS on its 2M-byte M80/4 and is using it, under IBM's Virtual Machine facility (VM/370), for program testing. The company also has VM/CMS, VS1 under VM and the Time Sharing Option (TSO) running under MVS and Vtam running under both VS1 and MVS.

That is a lot of software on a machine generally considered to be in the IBM 370/148 class, but a Mitrol spokesman said his company didn't limit the implementation of MVS on the M80. All the standard capabilities, including job accounting, are there, he noted.

Tagging the M80/4 as a 148-class machine may be underrating it. The manager of Mitrol's data center, Arthur C. Goff, said his CPU is getting 20% to 25% more throughput than he would have expected from an IBM 370/148.

The center is using MVS two to three days a week for six to eight hours each of those days. Mitrol works with just one MVS virtual machine, with three initiators, but it typically has 21

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Honeywell Finally Delivers, But . . .

Applicability of CP-6 Limited

By Nancy French
CW Staff

RICHMOND, Va. — Although Honeywell, Inc. has taken more than three and a half years to deliver the CP-6 operating system and a mainframe to run it on as an upgrade for its Xerox Corp. CP-V user base (see story on Page 4), the total system will only serve about 200 of the 1,200 existing Xerox sites.

The reason: it doesn't address the needs of the majority of Xerox system users whose processing supports such activities as research and development, flight simulation, power control and other heavy real-time activities.

Nevertheless, the president of the Xerox users group described CP-6 as a "very end-user-oriented, efficient time-sharing system." As such, it is "very attractive," according to David O. Clark, an associate principal scientist here at the Philip Morris Research Center.

Since Honeywell has been oriented to the business user, the Cobol performance is quite good, he added.

Clark further claimed that the system's price/performance will be competitive and its functionality as an interactive time-sharing system will be "superior to anything on the market."

The only things now available that compare, in his opinion, are Digital Equipment Corp.'s Tops-10 and Tops-20 operating systems, offered for the Decsystem-10 and Decsystem-20.

(Continued on Page 4)

PE Tops Off Scientific Supermini Series

By Tim Scannell
CW Staff

OCEANPORT, N.J. — Perkin-Elmer Corp. (PE) tossed yet another coal on the supermini fire today when it introduced a high-end, scientific number-crunching addition to its 3200 series of 32-bit machines.

Geared to compete with such scientific machines as Digital Equipment Corp.'s VAX-11/780, the 3240 series is said to offer 1.6 times the performance of PE's 3220 machines, introduced earlier this year [CW, Feb. 19]. The series consists of three processor packages — the 3241, 3242 and 3244, which differ according to memory size and I/O structure — and, and like the 3220, employs 16K-bit random-access memory chips in its MOS memory structure.

The 3240, however, directly addresses up to 16M bytes of physical memory that is configurable in four interleaved banks, a spokesman noted.

Set-Associative Cache

The 3240's memory is constructed with 256K-byte modules. The memory access/cycle time is rated at approximately 500 nsec with a 64M byte/sec peak memory bandwidth, the spokesman said.

Crucial to the 3240's increased throughput speed is the unit's 8K-byte, four-way set-associative cache, which "increases apparent memory speed" and delivers an effective memory access time of 250 nsec, according to the spokesman. The cache memory is eight times greater than the 3220's and employs a write-through modification algorithm technique to ensure that both the cache and the machine's main storage contain the same data after a write operation, he added.

The PE 3240

The 3240 memory also contains an error checking and logging feature that periodically scans the machine's operational functions and logs to an operator-established file for later maintenance, the spokesman stated.

Unlike the 3220, the 3240 can sup-

(Continued on Page 8)

Academics Seen Flocking To Industry Through '80s

By Brad Schultz
CW Staff

PROVIDENCE, R.I. — Universities will continue to lose many of their best computer scientists to industry research centers during the next decade.

That was the consensus of computer scientists and those who hire them at last week's inaugural symposium of the Brown University computer science department here. But the academics and managers from government and industry had different explanations for why the migration persists, reportedly leaving more than 600 U.S. faculty positions vacant [CW, July 2].

Not everyone saw the "brain drain" as hurting the quality of life in society. There are benefits, according to Gordon Bell, a computer scientist who is both Digital Equipment Corp.'s vice-president for engineering and a member of the Carnegie-Mellon University faculty.

First, the "flowthrough" of talent rejuvenates the research units in government and industry, Bell said. Those units would stagnate if the state of the art progressed only in ivory fowers.

Second, academics develop too many programming languages and operating systems — a situation that squanders available computing resources and

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According to Text of Decision

FCC Eyes Xten as Revolutionary

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. – The Federal Communications Commission (FCC) believes Xerox Corp.'s proposed electronic message system (EMS) will revolutionize the distribution of documents within the U.S.

That indication came as the commission released the text of its decision initially approving the application for the Xerox Telecommunications Network (Xten). The decision was announced last month [CW, Aug. 27], but the text wasn't issued until early this month.

The commission pointed out that while EMS technology is available, communications channels of sufficient bandwidth are not, except in special cases. For most users, the FCC said, the choice is between voice-grade channels operating at 4,800 bit/sec or less and private-line channels offering transmission speeds up to about 56K bit/sec.

Domestic satellite circuits offer higher speeds, end-to-end, but only if the customer can afford the cost of an on-premise earth station. Moreover, satellite facilities generally are not public.

As the commission put it, "A given customer cannot generally use [satellite networks] to communicate with another customer of the offering carrier."

By proposing a public service providing end-to-end transmission at 256K bit/sec via terrestrial microwave local loops, Xerox would erase these limitations, the commission explained. Further, the cost of installing microwave in urban areas would be "substantially less" than the investment required for similar wire facilities.

As a result, Xten "offers the potential for faster, more reliable and higher quality service."

Comments Requested

While tentatively approving key parts of the Xerox proposal, the FCC said it wants interested parties to comment on a number of related technical and regulatory issues before it takes final action.

Among these questions are some highly controversial ones – for example, whether and under what special limitations AT&T should be allowed to offer electronic message services; how much separation, if any, should be required between large parent companies (like Xerox and AT&T) and their EMS operations to prevent unfair competition with smaller, less affluent suppliers; whether nonproprietary interface standards should be required; and how communications privacy should be protected.

Comments are due Nov. 14 and replies by Dec. 14.

Congress Debating Role Of USPS in Electronic Mail

WASHINGTON, D.C. – The debate over whether the U.S. Postal Service (USPS) should deliver the mail electronically is moving onward if not necessarily forward.

The Senate deleted from a pending appropriations bill language that would bar the post office from spending U.S. Treasury funds to procure, operate, own or market an electronic message system without first obtaining specific congressional approval.

But in the accompanying discussion, various senators – including John Glenn (D-Ohio) – made it clear they want USPS electronic mail activities to remain experimental until Congress has considered the impact of a permanent offering on private industry. Glenn, who heads the Senate subcommittee responsible for postal policy, had opposed the amendment to the appropriations bill.

"The Commerce Committee has already stated its opposition to direct Postal Service involvement [in electronic mail] as a carrier," Commerce Committee Chairman Howard Cannon (D-Nev.) said during the discussion. Added Sen. Harrison Schmitt (R-N.M.), a member of the Commerce Committee: "I believe we must . . . not substitute a federal service where a private service can more economically, and in a technically superior way, serve the people of this country, both rural and otherwise."

A few days later, however, Rep. Edward J. Derwinski (R-Ill.), ranking minority member of the House Post Office Committee, said USPS must be "involved" in electronic communications to "guarantee the continuation of a viable postal delivery system which will offer new careers for postal employees . . . The Postal Service must be innovative if it is to . . . meet the changing demands of the mail-using public."

Referring to a recent Carter Administration policy statement, Derwinski observed that the White House endorses his position. The statement, among other things, said the President opposes any legislative or regulatory efforts that would limit competition in the electronic message field and directed the Postal Service to make its delivery services available to all carriers at the rates it charges itself.

"What the Postal Service will do is purchase electronic transmission from private carriers while making available the services of its delivery network to those same private carriers," Derwinski said. However, in a recent decision [CW, Aug. 6], the Federal Communications Commission said USPS cannot acquire electronic message transmission facilities unless it becomes a communications common carrier, and as Cannon pointed out, the Senate Commerce Committee is opposed to letting USPS become a carrier.

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Delivers on 3.5-Year-Old Promise

Honeywell Updates CP-V Operating System

By Jeffry Beeler
CW West Coast Bureau

TORRANCE, Calif.. — Honeywell, Inc. has begun fulfilling its three-and-a-half-year-old pledge to give its Xerox Corp. Sigma users a successor to their CP-V operating system.

About 200 members of the existing base of 1,200 Xerox users are expected to install the Honeywell upgrade in the next five years, according to David O. Clark, chairman of the Xerox Users Group. Clark is associate principal scientist at the Philip Morris Research Center in Virginia.

The CP-V replacement, which Honeywell promised to develop when it inherited the Sigma customer base in early 1976, has found its first U.S. user at a local service bureau specializing in medical applications.

Science Dynamics Corp. reportedly will use the CP-V follow-on, christened CP-6, to support a Honeywell Level 66/Distributed Processing System/C (Level 66/DPS/C), which the user finished installing only late last month.

G. Edward Bryan, a Honeywell consulting analyst who participated in CP-6's development, sees the Science Dynamics installation as a golden opportunity to evaluate the software's performance outside the controlled confines of his firm's Los Angeles Development Center. "We need to prove the operating system is viable for Science Dynamic and other commercial users whose businesses depend heavily on computers," Bryan said.

At the same time, he added, the test site here represents a change to rid the operating system of software bugs and thus avert potential installation problems at future CP-6 locations.

"When you're dealing with a brand new system and brand new parts, you need some real-world exposure to shake out the bugs that simply don't show up during development," Bryan explained.

Honeywell hopes to give the operating system even more "real-world exposure" later this year, when the firm opens two additional CP-6 test sites. One of those will be at the University of Toronto library.

Next March, when Science Dynamics' system becomes fully operational, it will replace the firm's four existing CPUs, including two Sigma 6s, a Sigma 7 and a Sigma 9, all of which use the CP-V operating system.

At about the same time the Level 66/DPS/C goes into full operation here, the medical service bureau will install a second Series 60 Level 66 processor to provide backup for the first mainframe, run production programs and aid application development, according to Sandy Panzarella, president of the company. In the meantime, Science Dynamics' DP staff will spend an estimated 3.5 man-years rewriting the company's application programs and transferring them from the Sigma processors to the newly installed Level 66 DPS/C.

10,000 Users Served

Founded in 1969, Science Dynamics performs accounting functions, patient billing, appointment scheduling, management reporting and other business applications for some 10,000 users including medical schools, clinics and physician groups throughout the U.S. The firm supplies microprocessor-based front-end processors through which users transmit their raw data for processing at Science Dynamics's computing center here.

In addition to a 6M-word Series 60 Level 66 mainframe, the center's most recently installed system incorporates three 256K-byte Honeywell Level 6 Model 43 minicomputers as front-end processors, four 1,600 bit/in. tape units, a tape unit processor, a 1,050 card/min card reader, a 1,600 line/min printer and a unit record processor. Eventually, the system will also incorporate 600M-byte disk units.

Although the newness of the first Level 66/DPS/C makes its performance impossible to evaluate yet, Panzarella expects the installation eventually to yield "significant" benefits for his company, which reportedly has been growing 40% annually.

Among its advantages, he noted, the system will support higher transmission speeds than the Sigma processors and thus give users added flexibility in configuring their communications facilities. While the Xerox machines can accommodate communication lines operating at rates no faster than 1,200 bit/sec, the Honeywell equipment and software will be able to accept data transmissions at rates at least as high as 9,600 bit/sec, Panzarella said.

Thus, a user currently forced to divide its communications among four 1,200 bit/sec lines, for example, will soon be able to consolidate its transmissions into one 4,800 bit/sec line, the company president added.

Another advantage of the Level 66/DPS/C is its ability to support disk units with storage capacities as high as 600M bytes. The Sigma-based system, by contrast, can only accommodate disk units as large as 200M bytes.

As a result, the Level 66/DPS/C can handle three times the disk storage of the Xerox configuration in the same floor space and at the same time cut the power consumption of Science Dynamics' hardware, Panzarella said.

Before choosing the Honeywell offaring as the latest addition to its computing center, the service bureau evaluated several other vendors' equipment, especially systems built around Univac 1100/60 and 1100/80 processors. Science Dynamics favored the Level 66/DPS/C, however, primarily because program conversion is expected to take only about one-third as long with the Honeywell system as it would have with its Univac counterpart.

CP-6 Applicability Small

(Continued from Page 1)

Despite the wait for the new system, there has been remarkably little attrition in the customer base, Clark noted. In fact, " a few new Sigma and System 560 sites have even been installed" since Xerox announced it would leave the computer business in late 1975 and Honeywell picked up its customer base early the next year.

Next Area of Attack

Now that CP-6 has been delivered, the user group's next area of attack is "to improve Honeywell's hardware," Clark said. In particular, the Xerox users want better CPU performance in scientific computation — particularly greater throughput and speed.

CP-6 is an outgrowth of CP-V — or Control Program 5 Modes — which included time-sharing, remote batch, local batch, transaction processing and real-time processing. CP-6 has emphasis in all those areas, he said.

Clark's lab at Philip Morris plans to install a Level 66/DPS/B mainframe with four million words of memory, the CP-6 operating system and all new Honeywell peripherals in the third quarter of 1980. He now has a dual-processor configuration comprised of a Sigma 6 and Sigma 9 with 256K words.

The two systems will run in parallel for about two years. Clark wants to take his time converting to the new system, he said. The greater capacity of the Honeywell system, which can support up to 120 terminals, will help meet his facility's increase in workload.

Eventually the Sigmas, which Philip Morris owns, will be moved out and the Honeywell mainframe will be upgraded to its full capacity.

But moving to Honeywell is moving to hardware that is "completely different," he said. "Obviously any assembly language routines have to be completely redone." However, there's a "fair amount of portability in the Fortran, Cobol, RPG and Basic. Almost all of the changes are upward to new standards."

Honeywell has a large conversion effort under way to assist users with these problems, he said. For example, the mainframer has promised utility programs to convert source code for some of the languages and to convert existing data bases and APL workspaces to CP-6.

The users have played a very strong role in defining the requirements of the system and have had three very strong technical committees working with Honeywell at the Los Angeles development center, according to Clark, who once served on the 32-Bit Real-Time Technical Committee.

Despite the three-and-a-half-year wait — which for some users has been a problem — the product is "awfully close to on-schedule," he claimed. In fact, "it's probably an industry first, both budgetwise and timewise."

Many users have survived by adding memory and peripherals from Telefile Compoter Corp., an Irvine, Calif., firm that also promised to deliver a mainframe to upgrade Xerox users. That system has yet to be delivered.

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House System Cleared in Phantom Voting Case

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The House of Representatives has cleared its electronic voting system from charges of mechanical malfeasance stemming from a recent case of phantom voting — recording votes for a member who was not present on the House floor.

After a thorough examination of the "system's accuracy and technical integrity," the General Accounting Office (GAO) concluded the system was operating correctly July 30 when it registered Rep. Morgan Murphy (D-Ill.) as present and voting while he was actually in Chicago conducting public hearings [CW, Aug. 13].

Apparently, "Murphy's [voting] card or a counterfeit was used," according to Rep. Frank Thompson Jr. (D-N.J.), chairman of the Committee on House Administration.

Addressing the counterfeit card theory, the GAO said: "Counterfeiting is possible, but controls over access to the House Chamber and use of the voting stations are expected to prevent use of such a card."

Record of Reliability

The system, in use since 1971, has by all reports been remarkably reliable. Based on a Control Data Corp. 1700 mainframe with identical backup, the system has 44 voting stations scattered around the House Chamber.

A member must insert his card into one of the stations and register his vote in person.

During its review of the system, the GAO "inspected the system's equipment and its environment and evaluated its hardware and software."

The GAO also examined the detailed "computer voting transaction log" for the day of the questioned votes before concluding "no unusual problems were experienced" that would account for "the reported voting anomalies of July 30."

Agreeing with the report, the House Administration Committee forwarded the findings to the office of the Speaker of the House. A next possible step would be an investigation by the House Committee on Standards of Official Conduct into the possibility that Murphy's card had indeed been counterfeited or that his card had been used by someone else to cast the six phantom votes.

Murphy stated recently he does not recall whether he had his voting card with him while in Chicago. He said he is looking into the possibility that his card may have been used by someone on his staff while he was out of town.

Such an action, if taken with the knowledge of the congressman, "would be considered highly unethical," according to one long-time congressional aide, who added he has never heard of it happening. Nonetheless, at least one member of the House Ethics Committee has expressed interest in pursuing the findings.

Search Launched For Whiz Kid

EAST LANSING, Mich. — Michigan State University (MSU) police here are still scratching their heads over the whereabouts of 16-year-old computer whiz James Dallas Egbert, who apparently vanished from the campus sometime around Aug. 15.

MSU police came up empty-handed in a search of the university's complex underground network of steam tunnels, where they believed Egbert was hiding as part of a science fiction game called "Dungeons and Dragons." After failing to turn up anything but empty beer cans in the tunnels, police are convinced the youth has left the campus.

"We sure can't find him," an MSU police spokesman said, adding MSU is now asking Wisconsin police for help in determining whether Egbert may have traveled to Kenosha for a convention on games.

"We're also working with a psychologist affiliated with MSU police," the spokesman said.

Since Egbert is considered somewhat of a game fanatic, police still haven't ruled out the possibility that his disappearance is part of a game. A cryptic thumbtack design on Egbert's dormitory bulletin borad is being analyzed for possible clues. An L-shaped figure on the lower right side of the board is considered a possible key to the case.

University counselors are usually appointed to look after younger students who come to the university. However, Egbert, who started MSU at age 14 spending a year at Northwestern University, had no counselor, according to a university spokesman.

Egbert was last seen about Aug. 15 in his dormitory dining hall. He was reported missing about a week later, the spokesman said.

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One Way to Unnerve a Computer Scientist

By Brad Schultz
CW Staff

PROVIDENCE, R.I. — Want to make a computer scientist nervous? Start talking to him about the difference between theoretical and applied science.

A case in point was last week's inaugural symposium of Brown University's computer science department, where computer scientists gathered to debate whether a gap exists between theory and practice in their discipline and, if so, how to bridge it.

"There is no natural theory-practice dichotomy in computer science," according to Bell Laboratories automata theorist Alfred Aho. But Philip Lewis, computer research director at General Electric Co., said such a dichotomy does exist. In fact, two "cultures" — theoretical and experimental — have developed, each with a jaundiced view of the other.

Philosophical Differences

"To theoreticians, experimenters are 'hackers' just screwing around," Lewis observed. But to experimenters, "theoreticians don't program; they are failed mathematicians."

Nevertheless, the two key research areas for the coming decade of computer science are neither exclusively theoretical nor exclusively experimental, Lewis declared. These areas are software engineering — methods for developing software more productively — and very large-scale integration (VLSI) technology.

University computer science departments should offer both theoretical and experimental courses, the speakers agreed. But some argued that strictly applied areas of computing are not computer science at all. DP should be taught in business schools, not computer science departments, they asserted.

Naming Disagreements

The formal names of such departments indicate a lack of agreement on what they ought to teach in classrooms or undertake in research, 1974 Turing Award winner Donald E. Knuth told *Computerworld*.

A number of U.S. departments use the label "information and computer science" or "computer and information science," the Stanford University professor noted. According to some, the distinction between information science and computer science roughly paralleled the distinction between theoretical and applied research at the time those departments were formed.

Knuth said he considers information science to be the study of what algorithms do to information. But other interpretations are also popular, he said.

Brown University Prof. Peter Wegner had the last word on the subject. "The conclusion of this panel seems to be that for computer science, no gap exists between theory and practice *in theory*, but that a gap does exist between theory and practice *in practice*."

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Academic Flight to Continue

(Continued from Page 1)

adds confusion to the user community, Bell maintained. On the other hand, corporate research units generally have more cohesive management policies that discourage such fragmentation, he said.

Obsolescence a Factor

The Brown symposium featured a panel discussion of a report to the National Science Foundation (NSF) that blamed academia's loss of experimental computer scientists largely on the obsolescence of university computing facilities.

At most universities, computer scientists must compete with students and administrative DP staffs for access to computer systems, the panelists noted. And typical academic departments lack funds for the procurement of the most advanced systems, which are needed for experimentation.

In contrast, some commercial research units — including Xerox Corp.'s Palo Alto, Calif., center and IBM's Yorktown, N.Y., operation — offer experimentalists easy access to the latest and most sophisticated systems, the panelists concluded.

However, the flight from academe may also reflect the higher salaries offered by industry, they agreed. In general, professorial pay scales, adjusted for inflation, are steadily falling to levels below even common entry-level salaries for commercial programmers and analysts.

Hence, professors with doctorates frequently see their students graduate at the baccalaureate or master's degree level and immediately take jobs paying as well as tenured faculty positions.

Computer scientists who leave universities to join industry usually continue to do research in computer science, according to Prof. Jerome A. Feldman, chairman of the University of Rochester's computer science department and chairman of the NSF's Ad Hoc Committee on Experimental Computer Facilities, which drafted the report on migrating experimentalists.

In fact, many migrators are able to do *more* research in industry — where research is their primary function — than they could in academia, where they must also teach, Feldman pointed out.

'Publish or Perish'

Peter Denning, vice-president of the Association for Computing Machinery (ACM), said the ACM Executive Committee is looking carefully into the situation described by the NSF report.

Many assistant professors struggling to win tenure probably resent the "publish or perish" atmosphere of academic departments, Denning suggested. At times, they may wish to build systems as a means to an end in research but fight this urge because systems building would interfere with the scramble to get articles in print.

In addition, at universities where computer science programs are amalgamated with other disciplines such as electrical engineering, computer scientists may resent having their tenure partly decided by "outsiders," Denning observed.

Although computer science is growing in popularity as an undergraduate major, the problem of unfilled computer science faculty positions is not likely to disappear in the foreseeable future, according to Andries Van Dam, chairman of Brown University's computer science department.

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Acpa Conference to Examine DPers' Motivation

By Jay Woodruff
CW Staff

WASHINGTON, D.C. — Are programmers and analysts in special interest computer associations motivated in their jobs in ways significantly different from programmers and analysts outside those groups?

That question will be partially answered at the ninth annual conference of the Association of Computer Programmers and Analysts (Acpa) when it is held here in late October.

Dr. J. Daniel Couger, professor of computer and management sciences at the University of Colorado, surveyed Acpa members to see how their attitudes about their jobs differ from a national sample compiled over the last few years. Couger will compare the responses from the Acpa membership with the national norm in his keynote speech Oct. 22, the first day of the three-day conference.

According to Couger, the study of members was conducted to determine "if their views and perspectives are different from the national sample." The results of Couger's national sample of programmers were published earlier in *Datamation*. The Acpa survey is the latest comparison to that survey.

Couger has conducted a number of surveys in order to develop a national sample of the spectrum of nonsupervisory jobs performed by DPers. In November 1978, he published an article in *Datamation* on the "compensation preferences" of DPers, and in March 1979 he published the results of a survey on computer operators and key entry and data control personnel.

He is scheduled to present the results of a nationwide survey on "Front-Line, Middle and Executive DP Managers" at the annual meeting of the Society of Information Management Systems later this year, basing the results on the participation of that Society's members in the survey.

At present, Couger is also doing a study of systems software personnel. In the case of systems software people, Couger's hypothesis is that "they think differently about their jobs from other people" in DP.

Couger agreed to speak at the Acpa national conference if that group would allow him to survey its members. About 20%, or 200 members, participated in the survey.

"The important thing," he explained, "is that I'm using a survey instrument that was developed by behavioral scientists [colleagues J.R. Hackman, J.C. Kane and G. R. Oldham] and validated prior to my using it. My objective was to compare 'us' with 'them'" — "them" being a national data base of 6,000 non-DPers employed in 5,000 jobs throughout the country.

Further information on the conference is available from Kendall E. Burroughs, DBD Systems, Inc., 1500 N. Beauregard St., Alexandria, Va. 22311.

WPOE '79 Set For Sept. 25-27

SAN JOSE, Calif. — The second annual Word Processing (WP) and Office/Business Equipment show (WPOE '79), to be held here Sept. 25-27, will feature a three-day professional conference focusing on "Plugging Into the Modern Electronic Office."

The three-day conference will discuss emerging technologies and their applications in the modern office and will present sessions on "WP Applications and Users' Experiences," "Interfacing Data and Word Processing," "Phototypesetting" and "The Integration of Telecommunications with Word and Data Processing."

Admission to the exhibition will be free. Cost for the entire conference is $125 or $45 for a single day of sessions.

Free exhibition tickets and further information is available from Cartlidge & Associates, Inc., Suite 1014, 491 Macara Ave., Sunnyvale, Calif. 94086.

Bulletin Probes Office of Future

WILLOW GROVE, Pa. — The advanced technology for running the office of the future is here already, but what its effect on people will be is unknown.

That is the conclusion of John J. Connell, executive director of the Office Technology Research Group, as expressed in the July issue of "Impact: Information Technology," the Administrative Management Society's (AMS) monthly newsletter.

One way to minimize unknowns, according to Connell, is to introduce the concept of office research in pilot programs for new office systems. In this way, it would be possible to learn how people interface with technology in the communications process.

Also published in the July issue of "Impact" was an article by Bert Vorchheimer of Vorchheimer & Associates. Vorchheimer coined the term "humanics" to describe the new phenomenon of man and machine interaction.

"Humanics takes the approach that we must try to introduce an intimacy with technology into our lives without destroying our identity as humans," Vorchheimer said.

Copies of "Impact" are available from AMS, Maryland Road, Willow Grove, Pa. 19090.

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Strike Hitting UK Workers in Pocketbook

By Rex Malik
Special to CW

LONDON — A strike by 750 computer workers in the British Post Office is now hitting 400,000 postal employees where it hurts — in the pocketbook.

Most Britons, however, are receiving a respite from financial burdens because the post office cannot prepare normal telephone bills without the computer systems.

The strike was called by the Civil and Public Services Association and the Society of Civil and Public Servants, which are seeking a 28% increase. They have pulled out just 750 workers — all of whom are computer operators, their supervisors, data preparation staff and programmers — from the post office.

The workers first struck in April, but until recently had been continuing to run the payroll for the 400,000 other employees of the organization. Now, however, that work has been stopped, too.

The post office is attempting to prepare payrolls manually but is just estimating overtime and other payments; it cannot guarantee that the pay packets going to workers actually reflect the hours worked.

The other effects of the strike on the billing operation will take months of work to set right, sources here said.

The post office's Telecommunications Division has so far failed to collect — because it has not billed — some $800 million that would have been due, sources estimated. That amount is said to be growing at a rate of approximately $75 million weekly.

The post office is preparing some bills manually, but only for the largest customers; most households are receiving a respite from their regular telephone bills. Under this system, the post office is reportedly taking in about $10 million daily — about half its normal revenues.

This has caused some cash flow problems for the Telecommunications Division, which has had to borrow funds from the postal division to continue operations. The two divisions maintain separate accounts with the Bank of England, and the postal operation is cash rich.

However, it is not lending the money inexpensively — it charges the Telecommunications Division a 14% interest rate.

'Laces' Undone

The Laces customs and excise air cargo clearing service, which is run on an IBM 370/168, has also been stopped by the strike. As a consequence, cargo clearance has been subjected to serious delays.

The post office's International Computers Ltd. System 4/72s are idle as well, as are 1,300 terminals in local offices around the country.

In addition to accounts and pay billing, directory information, equipment installation, service and maintenance data is also not being entered, and because inventory control has been hit, spare parts are difficult to obtain.

As a result, many telecommunications facilities are not being installed, and if a phone installation breaks down and needs a spare part, it is unlikely the phone will be properly serviced until the strike is over.

Post office spokesmen so far will not say anything other than that discussions between it and the unions are at a "lukewarm stage."

To make matters more difficult, the unions have just announced they are withdrawing five people whose absence could cripple much of the postal service. The five are responsible for issuing postage stamps to areas up and down the country.

Without them, the local post offices could be out of stamps within a month. In London, post offices could be out of stamps in even less time.

PE Unveils Supermini Series

(Continued from Page 1)

port up to four direct memory access (DMA) buses, each one responsible for up to 10M byte/sec of I/O throughput. This translates into an I/O throughput capability of up to 40M byte/sec that is distributed over 32 channels, the spokesman pointed out.

Like the 3220, the recent introduction has four priority interrupt levels and can handle up to 1,023 devices.

Geared toward scientific and high data collection applications, the 3240 offers a hierarchical storage scheme that uses three levels of progressively faster media that are transparently used by the system's CPU. The first level is an instruction prefetch buffer that takes instructions from the cache prior to the CPU request. The second level involves the four-way associative cache that prefetches both instructions and the data; the third level is the main storage itself, the spokesman explained.

The 3240 package is sopplied with a Load Storage Unit (LSU) that loads an automatic boot into the memory. The boot load program then loads the operating system from magnetic tape or disk.

The load program works in conjunction with a microcode-resident self-test feature. Full hardware memory management is provided by the system's memory address translator, the spokesman said.

An asynchronous, three-bus 120 nsec clock that is optional on the 3220 is a standard feature of the 3240.

A number of options offered for the 3220 are also available for the 3240 series. One, the floating-point processor, contains eight 32-bit single-precision registers and eight 64-bit double-precision registers, as well as 46 floating-point instructions.

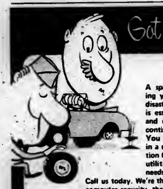
An optional writable control store (WCS) allows the user to configure special mathematical or scientific algorithms, Fortran or Cobol routines or any special functions written in microcode, the spokesman said. The WCS has 2K words of user-programmable memory and can be used to customize a system to a user's needs, he claimed.

The price of the 3241 with a 512K-byte bank of memory, a CRT, disk drive, tape drive and several of the options including the floating-point processor, WCS and battery backup is about $139,000, which is about $43,000 less than a similarly equipped Digital Equipment Corp. VAX-11/780, PE said.

The 3242, with two banks of memory, two DMA interface units and the same options, costs about $160,000; a similar DEC system is priced at $195,545.

A stripped-down, processor-only 3244 package that can accommodate up to four memory banks and DMA interface units costs about $137,000 with a minimum memory configuration.

Quantity discounts are offered for OEMs, PE said from its Computer Systems Division at 2 Crescent Place, Oceanport, N.J. 07757.



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User Running MVS on 148-Class Machine

(Continued from Page 1)

or 22 other "machines" with four initiators each running at the same time.

In addition to the 2M-byte main memory, Mitrol's nearly year-old M80/4 — the first system Magnuson shipped to any user site — includes five I/O channels and a pair of tape drives, 10 disk drives and a line printer — all from California Computer Products, Inc. — as well as an IBM 3704 communications controller and an IBM 3272 CRT controller. That supports a network of some 38 terminals from various vendors, as well as a lot of batch-oriented production work, Goff reported.

Mitrol, which recently became a subsidiary of General Electric Information Services Co., is the developer of the Mitrol Industrial Management System (Mims) which has been implemented and is being maintained in various hardware/software settings. That basically is why the company has to have the flexibility of VM/370 even thoogh it adds its uwn overhead.

A Little 'Assist'

Key to the M80's ability to run the hoge operating system is the microcoded VM Assist (VMA) firmware developed by Mitrol. The firmware provides two benefits, according to Kevin Anderson, Magnuson's vice-president of software development.

First, VMA replaces a substantial amount of software, relieving the machine of that system load. And, Anderson continued, the microcode implementation gets the work done a lot faster than the software can.

Speed really is the major benefit. Magnuson isn't the only vendor to offer microcode-based help on its equipment, but the logic in VMA performs some of the operating system functions -more than 50 times faster than they run under a pure IBM environment, Anderson claimed.

Becaose of its limited size and power, the M80/4 was not originally expected to serve as a host for MVS or need VMA, bot Mitrol saw the possibilities and pushed the vendor into the work. Because of its development work, Mitrol had to provide its programming staff with the basic flexibility of VM/370.

In fact, Anderson claimed that Magnuson was able to develop VMA for the M80 in less than two months, largely because of the approach to microcode that is inherent in the machine "and the caliber of people we assign to do the work."

Most important among the M80 firmware development tools, he said, is a powerful microassembler that provides "enormous flexibility" in symbol manipulation and dynamic language evolution. As an example of what the microassembler can mean, he noted that Magnuson has also developed a firmware assist for IBM's VS1/ESPC.

Anderson claimed that "anyone who can write 370 assembler can write Magnuson micfocode," but he shied away from saying that the capabilities have been or should be made available to the typical user site.

Magnuson learned a lot from tracking IBM's work with microcode, he said. One of the most important lessons learned was to use software-trained people, rather than hardware-oriented engineering personnel, to write the programs in microcode.

Even with VMA in place, the M80/4 as configured at Mitrol "probably isn't capable of supporting sustained work under MVS." The ability to do testing in that environment, however, could easily free a user's larger machine for production-type operations, Anderson added.

Mitrol Pleased

Goff felt MVS could be osed for production if it were run in "native" mode, without VM/370, on the M80/4, but then acknowledged that such an arrangement would leave the user without the benefits of VMA, so "maybe it wouldn't be practical after all."

Goff seemed pleased with his operation: "We didn't do anything different than we would for an IBM machine. We have not had to make any software modifications to any operating system."

He added that Mitrol is testing TSO under MVS, presumably under VM/370, thus working with three separate layers of system software/firmware.

Mitrol's M80/4 isn't the smallest configuration Magnuson can provide — the system can be made with only 512K bytes of memory — but Anderson said he couldn't recall any that have been delivered with less than 2M bytes. The maximum memory size on the M80/4 is 8M bytes, he noted.

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Managers on the Move

JOHN W. BATEMAN has been appointed director of data processing and KARL F. RAU has been named manager of systems planning for data processing at Atlas Van Lines, Inc. in Evansville, Ind.

Bateman began as a programmer for Mead Johnson & Co. and held several positions at Whirlpool before he joined Southern Indiana Gas and Electric Co. in Evansville, where he served as manager of data processing.

Bateman is a graduate of the University of Evansville and has attended classes at IBM educational centers.

Rau has been employed in the household goods moving industry as claims adjuster, accountant, dispatcher, customer service representative, computer operator, programmer and systems analyst.

As manager of systems planning, he will be responsible for identifying and interpreting the needs and problems of operating departments in the company.

John W. Bateman

Peopleware
???

HANK JOHNSTON has been appointed director of development for management information systems at Zale Corp. in Dallas, Texas.

He will be responsible for the maintenance, enhancement and development of business data for the company.

Prior to joining Zale, Johnston served as manager of retailing and distribution industry centers for Electronic Data Systems, Inc. He holds a B.S. degree in mathematics from Mississippi State University.

• • •

RICHARD J. KUIPER has been named DP manager for Boise Cascade's Paper Group's administrative headquarters data center in Portland, Ore.

Kuiper has been employed by Boise Cascade for 11 years and has had varying responsibilities in different divisions of the corporation. His most recent assignment was as manager of information systems for the Cabinet Division in Berryville, Va.

• • •

D. MICHAEL MEYER has been appointed director of management information services, and STEVEN M. RAMIG has been named manager of management information services for the Jacobsen Division of Textron, Inc. in Racine, Wis.

Meyer will be responsible for planning, development, implementation and operation of the management information services function.

Prior to joining Jacobsen, Meyer was management information services manager for the Bussman Manufacturing Division of McGraw-Edison. He holds a B.S. degree in physics from the University of Kansas and an M.S. in industrial engineering from the University of Missouri.

Ramig has been a project leader for manufacturing systems implementation at Bucyrus-Erie and a production control coordinator for Harris Metals, Inc. Most recently, Ramig was manager of marketing systems for management information services after joining Jacobsen as a senior systems analyst.

He will be responsible for marketing, distribution, financial, and human resources applications for management information systems.

Hank Johnston

ROBERT J. RHOA has been named DP manager of the All-Phase Electric Supply Co. in Benton Harbor, Mich.

Rhoa began his DP career with IBM's Service Bureau Corp. subsidiary in 1962. He has held various positions in computer operations, systems design, sales and data center management. Most recently he served as manager of Tymshare Corp.'s Midwestern data center in Benton Harbor.

Rhoa will be implementing an in-house system to handle general ledger, accounts payable and payroll.

• • •

RONALD. D. KOONTZ has been named manager of management information for Hydr-O-Matic Pumps, a division of Wylain, Inc. in Ashland, Ohio.

Koontz will manage system and data processing for the company, develop material requirements planning programs and organize and implement data base files.

Prior to joining Hydr-O-Matic Pumps, Koontz was project leader for manufacturing systems and material requirements planning at Grove Manufacturing Co. in Shady Grove, Pa. Earlier, he was a programmer/analyst of manufacturing systems for the Pangborn Division of Carborundum Co. in Hagerstown, Md.

Karl F. Rau

JAMES T. BUDELMAN has been appointed assistant director of computer services at Pasadena City College in Pasadena, Calif.

Budelman formerly worked as a project manager at Burroughs Corp's software development plant in Irvine, Calif.

He has an M.S. degree in management from Frostburg College in Maryland and a B.S. degree in economics from the State University of New York.

• • •

LESLIE ADKOWICZ has been named director of data processing at Jack Dill Associates in Hartford, Conn.

Adkowicz was previously employed as an associate engineer at IBM.

• • •

KENNETH E. WIEDEMANN has been elected senior vice-president for data processing at Washington Mutual Savings Bank in Seattle.

Prior to joining Washington Mutual, Wiedemann was vice-president for DP at Far West Savings and Loan Association in Portland. He has also worked for IBM and the U.S. National Bank of Oregon.

He holds a B.S. degree from the University of Oregon and is a graduate of the School of Savings and Loan at the University of Indiana.

• • •

SIDNEY C. MORRISON has been appointed director of data processing at Aeronautical Radio, Inc. (Arinc) in Annapolis, Md.

Prior to joining Arinc, Morristown served as commander of the U.S. Air Force unit at the IBM 360 School in Quantico, Va., where he managed all IBM training for Air Force personnel.

He holds a B.S. degree in meteorology from Pennsylvania State University and an MS in computer science.

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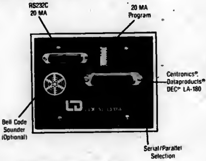

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Although Both Like the Concept

Large, Small Users' Plans for MFE Different

SADDLE BROOK, N.J. — Large and small DP users are united in their choice of the multifunction equipment (MFE) concept, but divided as to their plans for implementation.

In separate surveys of each user type, market researcher Input found that most small user organizations would install MFE as stand-alone systems, while large corporations expect MFE to fit into existing networks and interface with single-function equipment at remote locations.

Input interviewed 97 large corporate users — talking primarily to data processing, office service and communications managers at Fortune 1,000 firms with mora than 500 employees — about their attitudes toward MFE. Findings were compared with the results of a similar survey it conducted earlier [CW, July 16] of small users — firms that employ 500 or fewer persons.

Six Types of MFE

Both user populations differed not only on the way they plan to use MFE, but also on what types of systems they would buy. Input defined MFE as systems presently in use to which a second information processing capability has been added.

The firm defined six MFE categories:

- System No. 1 — a small business computer with add-on text processing.
- System No. 2 — text processing equipment with add-on computation capability.
- System No. 3 — a copier with add-on facsimile and an output printer.
- System No. 4 — a private automatic branch exchange (PABX) with add-on computation and text processing capabilities.
- System No. 5 — a communications network with add-on information processing.
- System No. 6 — time-sharing with add-on communications services.

User Preferences

While the majority (76%) of small users were most familiar with and receptive to systems in the first category, large users appeared equally knowledgeable about and interested in each of the six equipment types.

Asked which of tha systems they would consider buying, 83% of tha large corporations cited System No. 1; 77%, System No. 2; 86%, System No. 3; 64%, System No. 4; 78%, System No. 5; and 80%, System No. 6.

Although these differences were not great, System No. 3 was most widely accepted by large users because of its potential to reduce paper processing and minimize distribution problems. These respondents also noted that the copying and facsimila capabilities would be useful throughout the corporation.

Large corporations, unlike small installations, have been in contact with MFE vendors and stay abreast of the latest product offerings, Input found. Many also stated clear ideas of the capabilities they would require for certain systems.

For example, large organizations considered System No. 1 most useful at remote locations in a decentralized DP environment to reduce the information processing load at the corporate data center and to more rapidly process information used exclusively at the remote site.

Interest in System No. 2 came largely from those large users that require high-volume document production. Of most utility to these companies were systems that could communicate with the corporate data processor and with each other for use in either centralized or decentralized environmants.

Like many small users however, a number of the larga corporations could not visualize text or computational capabilities linked to a PABX system. As a result, System No. 4 was less readily accepted than the otharş; except by communications managers.

The disadvantages and advantages of MFE over single-function systems also were similarly perceived by both user groups. Cited as key disadvantages

(Continued on Page 14)

Multifunction equipment is defined as currently used equipment with a second information capability, according to Input. It includes six types:

1 Small business computers with add-on text processing

2 Text processing equipment with add-on computation capabilities.

3 Copiers with add-on facsimile and output printers.

4 Private automatic branch exchanges (PABX) with add-on computation and text processing capabilities.

5 Communications networks with add-on information processing.

6 Time-sharing with add-on communications services.

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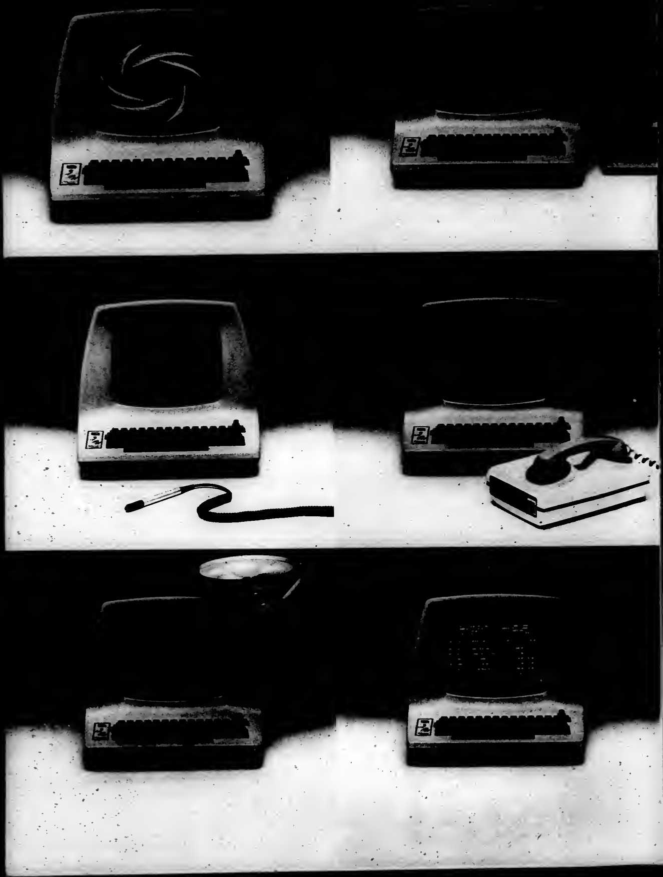

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Law Leaves DPers Open to Criminal Liability

BOSTON – Thrown in jail for a programming error? That's neither a 1984-ish prediction nor a Soviet propagandist horror story.

The possibility for criminal liability in programming exists here and now. It stems from the ever-increasing number of state and federal regulations promulgated every year that affect computer operations in industry, according to a recent issue of "Computer Law and Tax Report" (CLTR).

To avoid potential criminal status, DPers in industry must become aware of new regulations and make appropriate adjustments to their systems, the newsletter advised.

A newly enacted rule regulating computer operations affects programmers in the drug industry, CLTR noted. U.S. code states that anyone who causes "the adulteration of any drug . . . in interstate commerce" faces imprisonment of up to a year or a $1,000 fine.

Role in Adulteration

The law considers a drug adulterated if the methods, facilities or controls used in its manufacture, processing, packaging or storage do not meet "current good manufacturing practice."

Effective March 28 were new Food and Drug Administration (FDA) rules that set forth "current good manufacturing practices" for human and veterinary drugs. Among the rules was a section dealing with the operation of computer systems.

When computer equipment is used in drug preparation, FDA regulations require that:

- Routine calibrations, inspections and checking be done in accordance with written programs designed to ensure proper performance.
- Written records of these calibrations, checks and inspections be maintained.
- Appropriate controls be exercised to make sure that changes in production and control records are made by authorized personnel only.
- The input or formulas and other record or data into the computer be checked for accuracy.
- Backup files of data entered into the system be maintained (except when certain data, such as calculations, is eliminated in the automated process, in which case written records of the program must be maintained with appropriate validation data.
- Hard copy or alternative systems such as duplicates, tapes or microfilm be maintained to ensure that backup data is exact, complete and secure from "alteration, inadvertent erasures or loss."

Open to Prosecution

The failure of a drug manufacturer to set up and enforce these security, backup, access and documentation controls " will certainly lay it open to possible prosecution," CLTR warned.

In addition, the systems analyst who ignores these controls or the programmer who fails to document his program may also be liable.

Users Differ In MFE Plans

(Continued from Page 11)

were "the possibility of equipment failure without backup" and "large initial expense."

As advantages, users large and small noted "better response time", "fewer operations required to process information" and "lower overall cost."

Gating Factor

For large corporations, MFE's functional capabilities and its potential for improving employee efficiency were a stronger gating factor for purchase than saving on equipment costs.

Many users, for example, were willing to pay the equivalent of the replaced costs by combining two systems into one. That opinion was stated by 31% of the 41 DP managers for System No. 1; 33% of the 25 office service managers for System No. 2; 50% of the 31 communications managers each for Systems No. 4 and 5; and 25% of the DP managers for System No. 6.

While more users expected to save on the cost of MFE vs. separate single-function equipment, the anticipated savings was only 20% of current costs.

Called "Multifunction Equipment in Corporate Headquarters of Major Companies," the study costs $4,000 from Input at Park 80 Plaza West-1, Saddle Brook, N.J. 07662.

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L.A. Bus Strike Accelerates Car Pool Service

By Tim Scannell
CW Staff

LOS ANGELES — As more than a million Southern Californians scrambled for alternate means of transportation during the recent bus strike here, thousands relieved their commuting headaches by turning to a computer-based car-pool service.

Although there is no accurate way to tell exactly how many people started car pooling when buses in the nation's largest public transport system stopped rolling, Commuter Computer — serving five West Coast counties — logged about 7,500 over-the-telephone ride-sharing requests in the five days following the strike's Aug. 26 beginning. Sixty percent of those calls came from transportation-starved commuters who wanted to become new members of the service, according to Nancy Klein, the agency's director of marketing.

With a registered base of some 250,000 people and covering an estimated area of about 9,000 square miles, Los Angeles-based Commuter Computer is considered the country's largest and most extensive ride-sharing agency. Founded during the 1974 oil embargo — "the original gas crisis" — the nonprofit organization is primarily funded by the public and uses the City of Los Angeles' twin IBM 370/158 mainframes to process rider applications and destinations.

And if aiding consumers in their battle with the gas crunch isn't enough, the agency also uses car pooling as a weapon against Southern California's air pollution.

"What we're trying to do, on a regional basis, is get people to move back and forth among transportation alternatives without this gnashing and grinding of teeth," Klein explained, noting that even when Southern California's Rapid Transit District is operating, it's "a very iffy thing." Nearly 4.5 million people commute by car, bus or train each day; because of the size of the area, "we just don't have adequate rapid transit and probably never will."

However, "we do have an excellent freeway system. Nobody's ever going to get rid of all the cars, so now what we have to do is make those cars work more efficiently."

Process Starts Manually

Although Commuter Computer depends upon the municipal IBM machines to coordinate member files and produce rider lists, commuters are initially united through a manual scanning and gridding process. Regions are broken downb into about 6,000 grids measuring 1.5 square miles each, and people residing or working within the same geographic squares are grouped.

The grouping statistics are transferred to punched cards by an outside keypunching service, then run through the 370/158 processors at the city's DP site.

Members of the ride-sharing agency are given the computer-produced lists, specifying which people living near them follow the same departure/-arrival schedules and work in the same areas. The lists can be used on a daily basis or saved for an emergency, such as the current bus strike, or for something as mundane as a flat tire.

Pollution Fighter

The agency plays an active part in Southern California's battle against air pollution by helping area companies establish emergency car pool plans to reduce the amount of "mobile" emissions in the environment.

Because cities in Los Angeles, Orange, Ventura, Riverside and San Bernadino counties sometimes experience dangerous levels of air pollution, state air quality agencies require that companies with 100 or more employees file alternative employee transportation plans. The plans assure that in the event of a Stage II or Stage III pollution alert, these businesses will be able to reduce employee vehicle traffic by as much as 65%.

During a Stage II alert, which is considered to be serious, employees must come to work in cars carrying no fewer than three people and can be sent home if they do not comply. In a Stage II situation, employees may not be allowed to go to work at all.

While the air quality hasn't been bad enough yet to merit a Stage III rating, Stage II alerts have been issued as recently as a month ago.

"In the last year, citations have begun to be issued to companies, and a lot of companies are beginning to believe it's a little more serious than it used to be. As a result, we do get companies that call us up for assistance in trying to get their [car pool] plans set up," Commuter Computer's spokeswoman stated.

Reluctance to Use Agency

Ninety percent of the ride-sharing agency's business involves companies that either want to begin employee car pooling or estalbish pollution contingency plans. In fact, 1,400 of the 5,000 corporations in the five-county area are Commuter Computer customers.

However, a number of employers are hesitant to accept the service with open arms because it is free and costs both the employer and employee noth-

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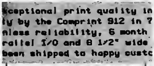

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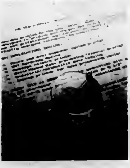

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Study Calls for Unique Personal IDs for EFT

By Jay Woodruff
CW Staff

Electronic funds transfer (EFT) systems need identification methods based on unique personal characteristics — such as fingerprints or signature: Plastic cards and personal identification numbers (PIN) aren't good enough.

These are the conclusions of Fred M. Gréguras, an associate in the Omaha, Neb., law firm of Kutak, Rack and Huie, and David J. Sykes of Honeywell, Inc. in Phoenix.

Although the present system of account cards and PINs will continue in use for the next five to 10 years, more elaborate and secure systems are under study. One of these, signature analysis, is not prohibitively expensive to implement.

It may also meet state and federal laws governing EFT, according to an article soon to be published in the *Computer Law Journal*.

Four Alternatives

Four other methods are under consideration: fingerprint, hand, voice or signature analysis. All cost more to implement than the PIN system.

Signature analysis, at an estimated cost of $1,000 per terminal, is the most attractive alternative. Biometrics — or analysis of the shape of the hand — follows at an estimated cost of $3,000 per terminal, while voice and fingerprint analysis cost an estimated $5,000 and $9,000 per terminal, respectively.

The PIN system, by contrast, costs only $100 per terminal.

Before any kind of authentication system can be "seriously considered," the authors stated, "the cost must be related to the risk of the event."

Training costs and downtime are important, as is the cost of lost business resulting from any customer difficulty in using the system.

"It should be painless, rapid and free of any embarrassment. The reliability and the rates of false rejection and false acceptance should be low — one in 1,000 transactions has been suggested as an upper limit for these occurrences," Greguras and Sykes stated.

Furthermore, the cost should be low enough to justify its use. The transaction should not take any longer to perform than it does now, and "it should be extremely difficult to bypass the process by simulating — from an external source — the signals that are normally transmitted into the EFT system by the authentication process," the article continued.

Signature Analysis

After evaluating the four techniques along with the plastic account card/PIN combination, the authors conclude that signature analysis is the only viable alternative to the present system, while the other techniques "will continue to find use in non-EFT applications ... where the number of people involved is small and the risk per event is high."

Even though signature analysis is "promising," they said, it will not be available soon because the systems under development are not consistently able to recognize several signatures by the same person. As a result, a system might reject a legitimate customer if the signature does not match the characteristics of a reference signature.

"There is a huge market waiting for a signature verification system that has an acceptable performance and low price," Greguras and Sykes pointed out. But until then, "EFT systems will rely almost entirely on the possession [of a plastic credit card] and knowledge [of a PIN] approach for authentication."

For PIN to be useful until something better comes along, the cardholder will have to shoulder more of the responsibility for its use. "To the clamor for individual rights must be added an equally loud cry for fundamental individual responsibility," the authors said.

Risk Covered

The risk of unauthorized transfers to both the financial institution and the customer is covered by the federal Electronic Fund Transfer Act, "which allocates liability for unauthorized transfers presently in force."

The law applies to both state and federal institutions, "but is intended to preempt state law only to the extent the protection provided to consumers is greater than that afforded by state law," the article noted.

Under Federal Reserve Board interpretation of the law, a customer is liable for only $50 of whatever losses are caused by unauthorized transfers if the financial institution is notified within two business days of learning of the situation.

"If the customer delays reporting the loss for more than two business days, his potential exposure is $500 if the loss could have been avoided by prompt notice," the authors explained.

These limitations apply even if the customer has written the PIN on the account card, although some state laws place more responsibility on the customer than does the federal law.

In Michigan, the user who writes the PIN on the card is liable for any unauthorized use of the card until it is reported. In Montana, the law holds the customer liable for half the losses incurred when a card with the PIN attached (or easily available) is used to gain unauthorized entry to an EFT system.

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SCHEDULED FOR DECEMBER 8, 1979

The annual examinations for the Certificate in Computer Programming (CCP) will be held on December 8, 1979, at selected test centers throughout the world.

Specific requirements for this year's three separate examinations in Business, Scientific, or Systems Programming are detailed in the "Certificate in Computer Programming Examination Announcement and Study Guide." The study guide and application form for the 1979 examination are available on request from ICCP.

Deadline for Filing Application is October 15, 1979

Please forward the "Certificate in Computer Programming Examination Announcement and Study Guide" along with application and test site list.

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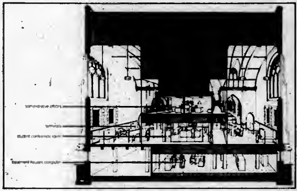

Section Perspective of RPI Computer Center

By Rory O'Connor
Special to CW

TROY, N.Y. — If you look for the new computer center at Rensselaer Polytechnic Institute (RPI), it won't be in the obvious place. But when you've made your way to what looks like a chapel, complete with stained glass windows, don't be surprised to find students bent over terminals instead of pews. It *is* the computer center.

Administration officials converted an unused chapel into a modern, functional computer center without losing the aesthetic qualities of the building. In addition to housing an IBM 3033 processor with 4M bytes of memory, the center is intended for use by students, faculty and the computer center staff. The redesigned building includes classrooms, offices and several common areas where students can work, use the interactive terminals and pick up hard-copy output.

"We looked at three basic options," according to Robert Gallagher, assistant director of computer services at the institute. "We examined the possible renovation of some classroom-type buildings on campus for a computer center, and there were a couple that were distinct possibilities.

"We took a look at eight different buildings altogether for potential sites. We also designed a new building, mostly underground, to conserve energy, but that came in too high [in price]." This factor led the school to renovate the chapel into the campus computer center.

The processor itself is housed in the basement of the building, where some support offices and storerooms are also located. The main floor consists of terminal access areas, student work areas and an area where output may be picked up. A newly created mezzanine houses offices and classrooms.

The design has left the windows and ceilings in full view, while still making the building energy efficient. In fact, the processor will be the building's only source of heat when the air temperature is above 20°F. Below that level, conventional heating will supplement the heat from the processor.

The center, with a series of IBM 3270 and Courier 270 terminals, supports computing activity on the entire campus. At present, 220 terminals can be in use concurrently, and plans are in the works for more than 400 altogether. In the center itself, 40 terminals intended for general use are located in two rooms.

"What we really did was build a glass house within the cathedral," said Gallagher. "Most of the offices are glass-walled and look out toward the stained glass windows."

According to Gallagher, the staff of the computer center helped in the design of the new building and is very pleased with the results. The staff is composed of people from good facilities and they are still "ecstatic" about the new center, he said.

The facilities are extremely elegant by most university standards, he stated.

Forum to Target Math Educators

TARRYTOWN, N.Y. — A conference entitled "Science and Math Education Through the New Information Technologies" will be held here Nov. 8-9.

Geared toward science and math educators, government and industry officials and school board members and science writers, the conference will focus on microcomputer, video disk and video tape technologies.

Topics to be discussed include how to make practical hardware and software acquisitions in light of existing budgets; differences among existing technologies; and the implications of using new technologies in the instructional process at all grade levels.

Among the speakers scheduled are Dr. Ludwig Braun, professor of engineering at the State University of New York (Suny); Dr. Sylvia Charp, director of instructional systems, Philadelphia Public Schools; Dr. George Litman, Chicago Department of Education; and Dr. Seymour Papert, professor of applied mathematics at the Massachusetts Institute of Technology.

As part of the program, there will be hands-on demonstrations and workshops on such topics as implementing computers in the classroom and authoring for the new technologies.

The conference is sponsored by Wicat, Inc., an independent, nonprofit research institute, under a grant from the National Science Foundation.

More information is available from Nancy Hughes, Conference, Wicat, Inc., Room 29E; 111 E. 85 St., New York, N.Y. 10028.

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CW9

Calif. Computer Crime Bill Seen Entering Books Soon

By Jeffrey Beeler
CW West Coast Bureau

SACRAMENTO, Calif. — Barring any unforseen complications, California's computer crime bill will enter the state's statute books later this month, a source close to the legislation predicted here recently.

S.B. 66 was expected to win final approval from the full state Senate early last week and then proceed later the same week to Gov. Edmund G. Brown Jr.'s desk for eventual signing.

If S.B. 66 does clear the Senate as predicted, the bill will have successfully completed a 10-month odyssey through both houses of the state legislature. The other house, the Assembly, considered the legislation during Labor Day week and then quickly passed it on a "consent calendar," which means the bill won unanimous approval without debate.

Little Opposition

Since its introduction on Dec. 5, the bill has encountered scarcely a whisper of opposition on its journey through two Senate committees, two Assembly committees and the the assembled bodies of both houses. The bill's only serious challenge came late last February when it met sharp but short-lived resistance during a Senate Judiciary Committee hearing, the first leg of its legislative journey.

Ironically, the bill's "noncontroversial" reputation might slow its progress slighfly once it leaves the legislature and lands in the Governor's office.

"Right now, the Governor is faced with a whole lot of legislation much more controversial than S.B. 66, and he might decide to put the bill aside for a while until he can get some of this pressing legislation out of the way," an informed source said here recently.

At any rate, sources consider it "highly improbable" that the bill will take effect before Jan. 1, 1980.

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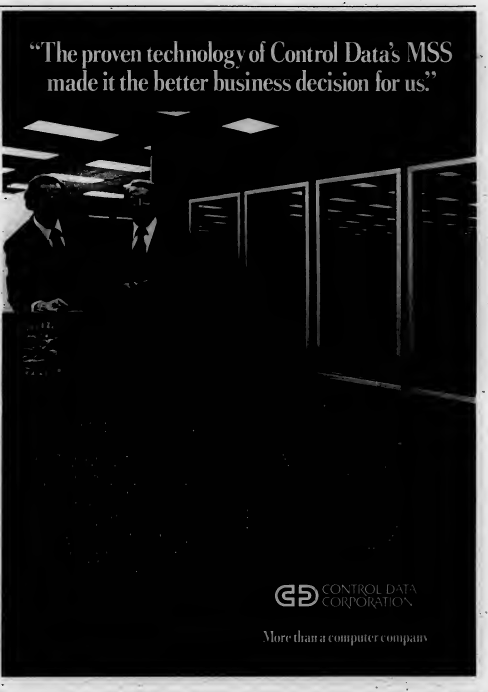
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Firm Braves Elements to Move DP Operation

By Tom Henkel
CW Staff

CHICAGO — When W.J. Haynes Co. decided to move its DP building to a new department in mid-January, it realized it might have to face snow — but four feet was a little much.

The self-insured health, welfare and pension fund administration firm inadvertently picked one of the worst weekends in Chicago's history as a moving date. According to DP manager Dick Lyon, however, it was all one big party.

W.J. Haynes is a multivendor shop. It uses an IBM System/3 Model 15D mainframe with four Memorex Corp. 3645 Winchester disk drives and a 900 line/min Decision Data Corp. printer. "I brought all the vendors together [plus the phone company] at one time so they couldn't point the finger at each other," Lyon said.

"The moving date was set well in advanced [of the snow storm], and we had made pretty detailed plans. We moved from our old quarters to Western Avenue — about four miles away," he said.

The company tore down the system early Friday morning, Jan. 12, and the movers took it away later that day.

It had been snowing all day Friday. By the time the movers got to the new building, snow was blocking the loading dock, "We had to build a ramp through the snow because we couldn't get anywhere near the loading dock," Lyon said.

"The movers had it pretty easy because it was still snowing and it was soft. That was only the first blast; the rest came Saturday morning when Memorex, Decision Data, IBM and the phone company were still here.

"The phone company had some difficulty. Because of the storm, they couldn't get test lines through," Lyon recalled. IBM also had problems getting through to its testing number.

After resolving telephone problems, things went smoothly. "The printer came up immediately, and the disk drives came up right after that. We had a little trouble with the mainframe until they all got together and decided it was configured wrong. It was configured for an A-2 only, which is the first two disk drives. Because there were four drives, they couldn't talk to the second two drives."

After changing the configuration, the systems-related problems were solved. But the three vendors, the phone company and Lyon soon found they had another problem outside.

By that time the snow "was up to the window sills, and [the sills] are about four feet off the ground. The IBM guy tore the transmission out of his new Pontiac Sunbird trying to get out of the parking lot. The Memorex service engineer only lived about five blocks away, so he just left his car in our lot — it was buried anyway.

With the relocated system up and running, Lyon thought he was out of trouble. By the following Tuesday, the DP center was caught up after almost four-days of downtime.

Only one little problem remained. Although the DP department managed to move its operation, the rest of the company — which was also scheduled to move into the new building — was delayed by the mammoth snowfall. As a result, the DP department spent the next month shuttling data from the new to the old building.

Seminars Slated For Nov., Dec. On Management

ROCKVILLE, Md. — Two seminars on the successful management facilities in the 1980s and sponsored by Computer Power Management Corp. have been scheduled for November and December in a number of cities.

The "Senior Executive Overview" will discuss major trends and techniques for managing computers, word processing and printing, for applying distributed processing and more.

The "Management Seminar" will discuss these trends and techniques in more detail and includes supervising and planning automated facilities and operations; the role of data communications in DP; improving human productivity; and test and control of computer operations.

The one-day "Senior Executive Overview" will be held in Chicago Nov. 12, in Washington, D.C., Dec. 3, in Fort Lauderdale, Fla., Dec. 10 and later in other cities.

The two-day "Management Seminar" will be held in Chicago Nov. 13-14, in Washington Dec. 4-5, in Fort Lauderdale, Fla., Dec. 13-14 and in other cities.

More information is available from Computer Power Management, Box 1403, Rockville, Md. 20850.

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Analyzes Different Strains

University CPU Boils Down Rice Crop Data

By Tom Henkel
CW Staff

BATON ROUGE, La. — Scientists here at Louisiana State University (LSU) are helping to keep the world informed about new strains of rice via a computerized recordkeeping and analysis system.

Using the university's main IBM 3033 CPU, scientists led by Prof. Prentiss E. Schilling analyze data submitted from laboratories in the U.S. and the Philippines and other major rice-producing nations in southeast Asia and Africa.

The laboratory data is submitted on cards and fed into the system at LSU's Department of Experimental Statistics remote site. It is then analyzed to determine each rice crop's yield, response to fertilizer, milling characteristics and nutritional value.

The goal of the ongoing research project, Schilling said, is to identify rice strains that are more nutritious, cheaper to grow and more resistant to disease and produce a higher yield per acre.

When better rice strains are identified, they are released to farmers on the world market.

"Yield data is collected by scientists in the field. We've got labs in Beaumont, Texas, the Philippines, northern Colombia, Africa and Pakistan" because rice grows differently under different conditions.

A farmer in the U.S. might find it more profitable to grow a different strain of rice than a farmer in Asia, Schilling explained.

The rice data bank contains information on about 60 production and cooking quality variables for different rice strains. Most frequently used rice strains are stored on-line in the 3033's 8M bytes of main memory, while historical data is stored on tapes and disks.

The LSU system includes 16 Model 3350 disks, eight 3330-11 double-density tape drives and 14 Model 2314 disk drives.

Using the LSU system as a base, the U.S. Department of Agriculture's National Agriculture Library in Beltsville, Md., plans to develop a similar system to analyze barley and soybean crops.

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L.A. Bus Strike Spurs Business

(Continued from Page 15)

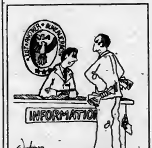
ing. "Employers become suspicious because they expect to pay for something they want," Klein observed.

'Not only do employers have to be convinced that the service is worthwhile, but employees have to be shown that they, too, can benefit by listing their names in Commuter Computer's data banks. "The employee basically doesn't give a damn about his employer's problem, so what we also do is show the employee that 'Hey, someday you're going to have your own emergency.' "

Besides maintaining its computer-produced ride-matching lists, the agency also coordinates van pool programs and has its own 140-van fleet. A prescription bus service and shared-ride taxi program are also part of the agency's offerings.

Currently, Commuter Computer is conducting a number of long range studies, investigating its needs and finding out the state-of-the-art in ride-sharing program development around the country. The agency is also searching for a way to have its computers "count the noses of car pools" to justify levels of municipal or federal funding, Klein said.

"The levels or new refinements, if you will, on what ride sharing is all about are really just beginning to come on-line and obviously . . . will have great ramifications in the software area of the computer business," Klein said.



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Calendar

Oct. 14-17, Atlanta — **Roscoe Users Group Meeting.** Contact: Karen Gradner, Applied Data Research, Inc., Rte 206 Center, CN-8, Princeton, N.J. 08540.

Oct. 15-17, San Francisco — **DP Project Management.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 15-19, San Diego — **15th Meeting of the Computer Performance Evaluation Users Group,** sponsored by the National Bureau of Standards. Contact: The Mitre Corp., Metrek Division, 1820 Dolly Madison Blvd., McLean, Va. 22102.

Oct. 16, Philadelphia — **Tabletop Vendors Show.** Contact: Data Processing Management Society, 505 Busse Highway, Park Ridge, Ill. 60068.

Oct. 17-18, Calgary, Alta. — **Western Computer Conference.** Contact: Whitsed Publishing Ltd., Suite 2504, 2 Bloor St., Toronto, Ont. M4W 3E2, Canada.

Oct. 29-31, San Juan — **20th Foundation of Computer Science.** Sponsored by IEEE Computer Society. Contact; Ronald V. Book, Department of Math and Computer Science, University of California, Santa Barbara, Calif. 93106.

Oct. 29-31, Tampa, Fla. — **Meeting the End-User Challenge.** Contact: Real-Decisions Corp., 111 High Ridge Road, Stamford, Conn 06905.

Oct. 29-31, New York — **Word Processing: An Overview of System Concepts and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 29-31, San Diego — **Educom Fall Conference and Meeting.** Contact: Carol Parysz, Educom, Box 364, Princeton, N.J. 08540.

Oct. 29-Nov. 1, Detroit — **Automat II, Integrated Factory of Tomorrow.** Contact: Society of Manufacturing Engineers, 1 SME Drive, Box 930, Dearborn, Mich., 48128.

Oct. 29-Nov. 2, Washington, D.C. — **Managing Data as a Resource.** Contact: Data Resource Management Association, 19 Orchard Way N., Rockville, Md. 20854.

Oct. 29-Nov. 2, New York — **Computer Contracts and Negotiations.** Contact: Brandon Consulting Group, 1775 Broadway, New York, N.Y. 10019.

Oct. 30-31, Chicago — **Exceleration: Expanding the Training Spectrum.** Contact: Advanced Systems, Inc. 1601 Tone Road, Elk Grove Village, Ill. 60007.

Oct. 30-Nov. 1, Houston — **Computerized Office Equipment Expo.** Contact: Industrial and Security Conference Management, 222 W. Adams St., Chicago, Ill. 60606.

Oct. 31-Nov. 2, Washington, D.C. — **Ecryption for Computer Communications Security.** Contact: TII, Box 49765, Los Angeles, Calif. 90039.

Oct. 31-Nov. 2, Chicago — **International Operations Seminar.** Contact: American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Oct. 31-Nov. 2, Toronto — **Intermediate APL.** Contact: Numetrix Ltd., Suite 600, 3 Church St., Toronto, Ont. M5E 1M2, Canada.

Oct. 31-Nov. 2, San Francisco — **Seventh National Datamanager User Group Conference.** Contact: MSP, Inc., 21 Worthen Road, Lexington, Mass. 02173.

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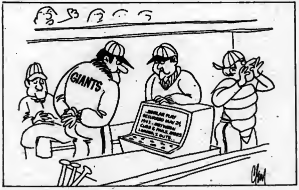
GIANTS
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Faculty Support a Must For CAI Success: Vendor

By Tom Henkel
CW Staff

MALVERN, Pa. — Selling a new teaching concept to the faculty is just as important as finding the money to pay for it.

That's the philosophy behind Systems & Computer Technology Corp.'s (SCT) computerized teaching systems. The consulting firm boasts a nearly 100% success rate in implementing teaching systems.

SCT is helping community colleges and medium-sized universities develop supplemental teaching programs using parts of commercially available packages and in-house-developed additions to existing software, according to the firm's academic adviser, Dr. Bruce Downing, who is currently on assignment with Cleveland's Cuyahoga Community College.

The reason many computerized teaching programs fail is because they do not take into account the specific emphases of the instructor teaching the course. Citing a Pennsylvania university that had a teaching system online for two years before anyone used it, Downing said that at least a majority of a school's faculty must be enthusiastic about the idea before the consulting firm will recommend installing an educational system.

Cost-Effective Solution

Colleges lacking graduate programs — and the grad assistants that go with them — are often hardpressed to find methods of teaching basic concepts to students without taking up the time of higher paid professors. Computer-assisted instruction (CAI) is a cost-effective solution.

Other universities use CAI to provide remedial education. "Drill and practice [of CAI] can significantly decrease the number of failures for students who were earning Ds and Fs. Students' motivation is increased because results are issued immediately when the drill is successfully done," Downing said.

By adding a tutorial mode to a CAI system, students are presented with specific bits of information, quizzed on that information and then given backup information to reinforce correct answers, Downing explained.

A more flexible instructional mode can also be installed that offers a branching sequence. If a student shows sufficient knowledge in a specific area, the CAI software will switch to more sophisticated material. If the material is too difficult, the software will shift to easier lessons.

Although CAI is generally used as a remedial teaching supplement, Downing noted it can also be used for gifted students. Remedial CAI emphasizes basic skills, concepts or memorization, while enrichment CAI is used for problem solving.

Structured courses with a logical progression are best suited for CAI. Math and natural and social sciences have been most successful, Downing said.

'Self-Sufficiency'

In the Cuyahoga system, for example, faculty members who want to use CAI must first provide a detailed report on course objectives. Instructors then work with the computer center to develop individual programs.

Keeping the faculty in touch with the developing program is essential to make instructors "self-sufficient" in using the system, Downing said.

When CAI was used as a supplemental tool in teaching psychology, Cuyahoga students showed a 20% improvement in national standardized test scores — an improvement Downing said was related to the change to the CAI system.

"Instructors are sometimes forced to use courseware which was developed under a different set of educational objectives. Consequently they have to modify their own objectives to meet the restrictions of the programs," Downing noted.

This method usually doesn't work because instructors tend to fall away from using the system. This is the major problem with packaged CAI systems such as Plato and Ticcit, according to Downing.

At SCT emphasis is placed on how a CAI package relates to the material the instructor teaches, Downing said. The firm also offers consulting and computation center management contracts for colleges and universities.

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EDITORIAL

A Word of Warning

Microprocessor developments may be outstripping the ability of the industry and end users to apply that technology, Dr. William H. Davidow of Intel Corp. warned recently [CW, Sept. 10].

And that's a message that should be taken to heart by all in the industry.

Davidow, vice-president of the big chip maker's Microcomputer Systems Division, observed that the problems of applying the current technology are not being adequately addressed in the industry.

Too often the chip makers seem to be caught up in a technological whirl — producing ever faster and ever smaller chips.

Chip density doubles almost every two years and speeds increase almost as rapidly. Yet often, as Davidow noted, real-world applications are not developed to take full advantage of these systems before the manufacturers are off on another turn of the technological merry-go-round.

Perhaps it is time for many of these manufacturers to take a hard look at applications and real-world uses of their products. Maybe much faster and smaller chips are not really needed and many more uses could be made of the present technology.

Or, as Davidow put it, maybe it is time to attack the mundane with more enthusiasm than in the past.

DATA PAST

Five Years Ago
Sept. 18, 1974

WHITE PLAINS, N.Y. — IBM took the wraps off a "unified" telecommunications architecture for network design using Synchronous Data Link Control (SDLC). It also introduced a "framework" of terminal products that would let users apply full-duplex SDLC techniques in general-purpose business applications.

ATLANTA — IBM introduced a System/3 Model 8 that featured an Integrated Communications Adapter (ICA) and no provision for card I/O, unlike earlier models in the series. The Model 8 was to be employed either for batch processing using a directly attached 3741 data entry station or on-line processing.

Eight Years Ago
Sept. 15, 1971

NEW YORK — Digital Equipment Corp. became a full-fledged mainframe supplier in the IBM 370/135 through 370/155 range. Its additions to the Decsystem-10 line included a complete line of software, double-density disks, communications equipment and built-in, double-precision floating-point hardware

---

UNIVERSITY PARK, Pa. — Charles J. Johnson had never had a Shell Oil Co. credit card, but the Shell computer had been sending him bills and dunning letters for the past year. Johnson was one of many college students to be sent an unsolicited credit card, but Johnson said he never received it. Unfortunately, sometime after the mailing, several thousand of the names and addresses became separated from the credit card numbers. When a Maryland woman named Johnson began using her card, the number was incorrectly associated with Charles Johnson's name and address, and the bills were sent directly to him.

MIKE MEGABIT'S
DP UPDATE
MA BELL
NO, MIKE, WHAT REALLY SENDS ME UP THE WALL ISN'T SOME MICROWAVE OUTFIT TRYING TO HORN IN ON ME AS GOD-GIVEN CUSTODIAN OF THE TELECOMMUNICATIONS BUSINESS...
IT'S ANY SOFTWARE OUTFIT THAT TRIES TO KEEP ME OUT OF THE TERMINAL DATA BASE INFORMATION BUSINESS!
Computerworld

LETTERS

Blue Shield Payments

Reference in the Aug. 6 Taylor Report to physician payments by Blue Shield of Massachusetts gave an unfair representation of the payment system and requires correction.

The article claimed that doctors play a "guessing game" in submitting charges for services to Blue Shield subscribers as a means of inflating their fee schedules. This is incorrect. The level of reimbursement used by Blue Shield to compensate a physician (under the usual and customary system) for a given service or procedure is called a "profile." The profile for a given procedure is based on historical charge data, and this profile for reimbursement is generally in effect for one year.

Physicians who request (in writing) their personal profile of reimbursement are provided with it as well as an opportunity to discuss any questions they may have as to its appropriateness, derivation and relativity with a representative of Blue Shield. Recently, as a matter of information for all providers, the complete schedule of maximum allowable charges for the most frequently reported services has been openly published.

During the past several years, maximum allowances have been controlled by limiting increases to the Consumer Price Index. These increases are subject to approval by the Massachusetts Division of Insurance under a formal reporting procedure by Blue Shield. Fee "guesses" by physicians would, therefore, have little if any effect on payments for covered services.

Please note that Blue Shield has no "third-party invoice system." For every claim processed, provider and subscriber receive an Explanation of Benefits form which records the fee allowance and the subscriber balance, if any.

The "report" completely overlooked the reimbursement system's contribution in constraining the escalation of physicians' charges by millions of dollars each year.

Martin R. Burke
Vice-President
Professional Relations
and Utilization Review
Blue Shield of Massachusetts
Boston, Mass.

'Pulling the Plug'

It is truly unfortunate that "Pulling the Plug on Dirty Power" [CW, Aug. 20] was something far less than an "in-depth" article. There is already too much confusion in the industry with respect to "computer quality power" without further contamination of the information base.

If "rotary machinery is the hands-down choice of major computer manufacturers," then why do IBM, Amdahl Corp. and others have solid-state power in their own facilities? Why are users pushing them to solid-state?

The study by George Allen and Donald Segall of IBM was a "landmark power" study when it was performed — over several years prior to its presentation at the IEEE PES Winter Meeting in January 1974. I think Allen and Segall would admit that their findings are now out of date.

If "the uninterruptible power system (UPS) must be remotely located," how come so many are installed on the computer room floor?

If a "power consultant is almost a requirement," how come more than half of all successful UPS installations never had one?

If "what most customers purchase and install is not [a UPS], but rather the components out of which a system can be constructed — usually with great difficulty and expensive trial-and-error learning," why do so many of the Fortune 1000 companies have successful installations and support a $100 million plus industry?

R.L. Cooper
Sunnyvale, Calif.

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HUMAN CONNECTION/Jack Stone

DP Managers Required To Be Politicians, Too

"I had a great career ahead of me as a DP manager, but I got out. Do you know why?"

This question was posed to me a few weeks ago by a business friend and, needless to say, ex-DP manager.

He went on to say, "There are three capabilities a DP manager must have, and here they are, in order of importance. First, he must be a first-class project manager. Second, he must be very strong, technically. Third, he must be a successful politician.

"I'm a terrible politician, so I left the job because I knew I wasn't going anywhere."

In analyzing his professional future, my friend had extended the meaning of the term "political" to include all of those personal attributes that are needed to influence, cajole and lead his peers and executives through the information systems maze, excluding the ability to get a DP job done and understand the technology to be used in the process. To his credit, he not only recognized the significance of politics in the business of DP management, but fairly identified his shortcomings.

As a senior manager in the DP department — or any other, for that matter — one is faced with a major responsibility for communicating his own plans to the remainder of the organization and convincing others to accept them. For this very difficult task, the DP manager must be a master at "How to Win User Friends and Influence Top Executives." (In case you didn't notice, this is a variation on a book theme by Dale Carnegie — and if you haven't read his masterpiece by now, you should, and then apply his teachings.) This column, and occasional ones to follow, will address this subject.

Long-Range Plans

Getting executives to accept the long-range DP plan is a good case in point. Typically, a DP manager will collect a horrendous amount of statistics, charts, graphs and, if a job accounting system is installed, printout, to justify a huge growth in the aggregated DP workload in the coming years. He will then forecast the increase in computing capacity that is required, the machinery to support the increased power and the dollars needed.

The plan is conveyed to top executives by proud DP authors, who view it with all the interest of reading Webster's dictionary. What is not generally recognized by DPers is that the strategy underlying this type of planning effort is tantamount to political hara-kiri.

To gain acceptance of a DP plan, one has to understand the history of executive relationships with the DP planning efforts.

Executives pass through several epochs in their dealings with the DP plan. The first is the "Age of Innocence," which is characterized by their abysmal ignorance of the DP function. In this era, the executive perceives DP to be a "virtual" organization, one which has budgets and personnel and machinery but, more or less, runs by itself. Here, the executive naively accepts the plan without significant comment, thinking, "Well, I'm paying my

(Continued on Page 28)

READER COMMENTARY/Walter B. Novinger

Flecs Proving Efficient As Fortran Alternative

I have just read, with great interest, "What Ever Happened to PL/I?" [CW, Aug. 27], and feel that our experience at Power Technologies, Inc. (PTI) might be of interest to *Computerworld* readers.

We, too, are strong believers in structured programming and have considered several of the many languages available. Our programs are, for the most part, involved with electrical engineering problems lending themselves to efficient expression in a language such as Fortran. Our staff consists entirely of engineers. Each engineer is responsible for his own programming; we employ no programmers.

Until about four years ago, the only programming language used at PTI was Fortran. Our computers have good compilers and adequate extensions to Fortran for engineering uses. What was lacking, we felt, was the ability to clearly express the complicated logical constructs inherent in computing modeling of power systems and in power plant simulators. Then we discovered Flecs, a Fortran preprocessor written by Terry Beyer at the University of Oregon.

Flecs supports structured programming constructs, such as WHEN. . . ELSE, CONDITIONALs, SELECTs, UNTIL (condition) and procedure calls, to name a few. Using the features of Flecs, it is very easy to write programs of substantial size (1,000 to 2,000 lines) which use no GOTOs or labels (other than on FORMAT statements).

One inherent advantage of Flecs is that the code becomes virtually self-documenting, as one becomes used to programming "topdown" through the use of internal procedures [e.g. IF (condition) OPEN-A-FILE] which may be written initially as "dummies" to test the logical flow of the program. To illustrate the clarity of Flecs code, I have coded the flowchart shown in the aforementioned article in Flecs:

```
C — ENTRY AT L1 —
C
  WHEN (X.GT.Y) A=1
  ELSE
  .    A=2
  .    UNTIL (U.EQ.V) CALL SUBR4
  ...FIN
  C=4

C
C — END ALGORITHM
```

Several comments regarding the preceding example are in order:

- The Flecs processor produces the indentation shown within the ELSE clause. The user enters all his code starting in column seven, the same as with Fortran.
- The UNTIL clause performs its test at the top of the loop, so may produce a zero-trip loop. The companion operator, REPEAT UNTIL, performs the test at the bottom of the loop, so always produces at least one trip.
- The range of any Flecs clause may extend over several program statements (as in the ELSE clause above). The end of the range is signalled by a FIN.

This is not intended to be a Flecs primer, so I don't dwell on the language's fine points. From the above

(Continued on Page 28)

WHITE HAT — BLACK HAT/Herb Grosch

An Open Letter

Dear Mr. Clausen:

I write you as a concerned veteran of the computer revolution and from the viewpoint not only of officership in the senior professional society in the field, but from that of a former federal civil servant who was deeply concerned with standard computerized processes throughout the U.S.

I was an acquaintance of and a collaborator with Al Zipf from the earliest days of the magnetic ink encoding excitement, and as a consequence I have always been aware of the enormous load of checks which flood into your system. That flood has always seemed to me to be the lifeblood of American banking, and when I lived in Europe and when I visit overseas today, I note the great differences there — Britain, somewhat like us; Italy, Spain, even France, very much less check-driven.

I recognize that other forces in our national financial network, notably American Express and the credit card operations in your own and other banks, have planned to replace or at least to parallel consumer reliance on checks with other paper — credit card charge slips — and that the computer and communications suppliers are pushing for electronic authorization. From the point of view of data processing people, the first is trivially different: the same machines, the same programs (or, more precisely, the same types of programs) can handle the new documents.

Electronic authorization, electronic funds transfer, cash dispensers and other less-paper techniques are much more exciting, much less understood and clearly much more dangerous than present systems.

Much of what my ardent fellow professionals promise in such matters will certainly come to pass, as will the crimes at which I hint. But it will be decades before checks are driven out of the American banking system by chip technology and foolproof data communications, putting aside questions of changes in federal and state law and in banking regulations that will have to be argued over at great length.

A reply from A.W. Clausen will appear in next week's issue.

I believe that legal authorization and consumer acceptance of that technology is seriously threatened by the premature erosion of the paper check system. If people are treated badly by banks and merchants now, they will be much more skeptical of bank and computer company propaganda when really worthwhile electronic money systems are pushed.

You want that electronic revolution — otherwise you will have to hire a quarter of the young people of California to work as tellers and in back-room operations. For it to succeed, you must prop up the paper check, not tear it down.

If you are being advised to the contrary, please do not listen. To destroy confidence in what once was and can still be a rapid and safe way of handling money is to generate skepticism and reinforce Naderite attacks on everything newer.

The particular abuse which is most threatening is the growing difficulty your private customers have in persuading your commercial customers to accept your checks. The triple use of "your" is not an accident; I believe the Bank of America is uniquely placed to address and improve the situation, because of its huge place in the national and state banking system, and because it pioneered magnetic ink character recognition and bank credit cards and check guarantee cards.

Increasingly, merchants and banks themselves are reluctant to accept checks. They require driver licenses, credit cards and, in some exceptionally insulting establishments, photographs or fingerprints before grudgingly taking the check. The guarantee card is almost worthless, and I myself have never seen a clerk compare a guarantee card signature — or for that matter, a driver license signature — with that on the check.

One does see credit card signatures matched to those on slips, although not often; checks, never.

I gather that there is a charge of some sort for merchant protection under the guarantee card

(Continued on Page 30)

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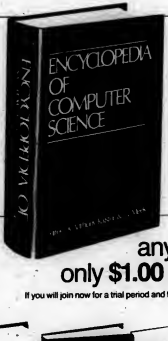

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THE TAYLOR REPORT/Alan Taylor

Nodal Systems to Revolutionize DP Operations

"Nodal computers" will have a dramatic impact on procurement and programming. Prospective users would be well advised to study the implications of nodal computing before selecting new hardware or software.

Prime Computer, Inc.'s Series 50 is representative of the new nodal systems. It's not that Prime offers the only ones around; but for commercial work in particular, it appears to have well-integrated systems currently available. They are good examples of nodal computing, both by demonstration and by documentation.

Nodal systems will be forthcoming from other sources, too, so it is well to be prepared even if your installation is not currently using nodal systems. It is only a matter of time before it will.

Methods; Economics

Nodal operations differ from the traditional systems both in programming methods and in production economics. In a nodal system, any part of the computing resources in any private or public network is available to every programmer to help him produce, test and modify programs — with all the specialized tools, data bases and other items that a site's own system either never had or could not fit into its production. That's a big change.

In production, the economics of how much hardware is located at any particular node becomes subject to a trade-off in off-loading, while the cost of hardware conversion can be practically eliminated because of the nodal architecture. Any procurement has to take into account the possibility of off-loading peak loads between nodal computers and the cost of additional hardware at each node point to provide necessary safeguards.

Localizing Operations

In the Prime series, all file, device, program and control instructions apply to any node exactly as they do to the local nodal computer. (Default values always go to the local system, so there is no difficulty with duplicated names.)

Problems of lines or computers being down will be no more troublesome than the problems of devices being down in one's own computer room. Even in a complete power loss, the network keeps functioning, with the downed system acting as uninterrupted but noncomputing elements.

Network formation is equally simple with the Prime series. Local or private nets can be set up ahead of time for best economics. Common carrier nets are also available, with various standard protocols, so that occasional or ad hoc systems can be created.

All the facts are clearly set out in the Prime manuals. But the implications, particularly on programming, are not so obvious.

Think of the user of a small Prime 50 system — say a Model 450. He can not only use a 450 node terminal to prepare his programming, but he can then ship it over to a powerful 750 for testing and use data for developing and evaluating the tests from any other node or data file. Then, after testing, the programming can be optimized and brought back to the smaller system for production. *That's* nodal programming.

Of course, even in production, use can be made of the larger or smaller systems as the environment requires. Particularly complex routines can be shipped out, if that is appropriate. Unexpected results which demand review can be shipped to experts or to places with special tools or data, and their responses can be shipped back — as though the programmer were programming the network, not just a system.

With this type of interactivity, commercial programming can get a jump toward improved reliability and better

(Continued on Page 30)

Datapoint just opened a local service office in Lafayette, Louisiana. It's one of 42 new ones we opened this year.

That brings the total to 138 and places our customer support personnel as close as possible to the people who need them...whether they're in Lafayette or Los Angeles.

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DATAPOINT CORPORATION

Flecs an Attractive Alternative to Fortran

(Continued from Page 25)

example, it may be seen that Flecs offers most, if not all, of the advantages of modern structured languages. What makes the language particularly appealing to us is the fact that the computational content of algorithms may be expressed in a language (Fortran) which is ideally suited to scientific processing, while the logical portion of the program is expressed in a structured manner, via an easily learned syntax.

Inasmuch as Flecs is a preprocessor which generates Ansi standard Fortran, there is a penalty paid when compiling programs. We have found that Flecs require about the same amount of CPU time as the compiler. However, as with any structured language, the savings in time experienced by the programmer when using Flecs outweighs the penalty in CPU time.

In summary, I feel that Flecs deserves serious attention from those who are looking for alternatives to Fortran or who are making an initial foray into choosing a programming language for their DP needs.

I might also note that I have written several word processing programs entirely in Flecs, including spelling checking programs and automatic hyphenation routines involving hashed data bases. Flecs is definitely superior to Fortran for applications such as these.

Those interested in acquiring Flecs should write to Beyer at the University of Oregon's Computer Center in Eugene for information. The program is in the public domain and is available for a variety of machines for a media fee only. In addition, Flecs is available for Prime Computer, Inc. systems from the Prime User's Library Service (Pulse).

Novinger is an engineering assistant at Power Technologies, Inc. in Schenectady, N.Y.

DP Managers Play Politics

(Continued from Page 25)

DP manager to do his job, and I assume he knows what he's talking about."

The second is the "Age of Bewilderment," which is described by frequent concerns expressed by the finance department over the regular DP budget overuns, interleaved with increasingly strident user complaints. Here, the executive, politely and humbly asks the DPers why the users should be so unhappy after the DP budget is increased.

The answer he receives is blanketed with incomprehensible technical explanations, so he gives in to the DPers, thinking, "I'm dumbfounded by that DP crowd. Usually, if I give a department more money, it does a better job, but in the case of DP, the users never seem to stop complaining."

The third is the "Age of Enlightenment," which comes about after the executive finds himself spending an inordinate amount of time trying to straighten out the conflicts between DP and the rest of the organization. In an attempt to resolve the problem, he forms a DP task force of managers who, after their first meeting, delegate the task force responsibilities to their subordinates. So, to save himself some time, the executive is forced to involve a dozen more people.

The executive ends up, shaking his head, thinking, "This is not the answer. I need a DP manager in there I can work with, one who can live within a budget and resolve the user problems at his own level. I need a 'politician'!"

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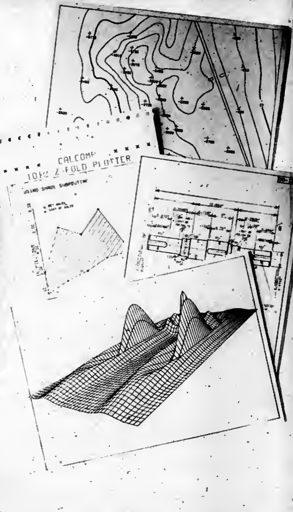

SOCIOLOGY OF COMPUTING/ Robert L. Glass

Numbers Game Pays Off for Smart DPer

DP managers like numbers. The more important numbers sound, the more they like them. The quality and origin of the numbers is often of lessor concern.

Most of the time, computer technicians alternately laugh or blush about numbers that get repeated so often they become gospel, when they know that the intrinsic value of the numbers is zilch. Sometimes, though, technicians can get some benefit from management's strange proclivity for qualityless input.

Rumley Dogged was the manager for one of the largest application software projects at Balderdash Iron and Steel. And Rumley had a reputation for having a bark that was worse than his bite. This would have been all right with the people who worked for him, except for one vital thing — his bite was pretty vicious.

One of Rumley's favorite MOs was to give assignments and set deadlines at the same time. Viewed superficially, this makes a lot of sense. Rumley's employees always knew where they stood, schedule-wise.

Enter Whitney Mount into our story. Whitney was a bright and promising computer science graduate hired into the Balderdash world about a year before our story takes place.

Whitney knew enough to be offended by Rumley Dogged, but he knew enough not to cross him, too. Still, Whitney had principles and enough of a sense of both responsibility and fairness that a clash with Rumley became inevitable.

Their collision course became apparent when Whitney got one of those "week ago yesterday" assignments from Rumley. "I want to know the size in instructions and data of all the applications software in the Shop Scheduling program," Rumley boomed one day, in a voice that could be heard halfway to Duluth.

"By tomorrow," he added, his eyebrows knitted together in a "brooks no discussion" expression.

The entire software staff blanched. Shop Scheduling listings stood six feet high in their stocking feet in the Program Library.

Whitney was deep in card chaff, and he knew it. Nobody was about to have the answer already. The only way to get it was the hard way.

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Blowing the dust off the Shop Scheduling listings, Whitney pulled the first binder off the top of the stack and turned to the linked map. Then, for the second time that day, he blanched.

Using the map, he couldn't distinguish between instructions and data. He had to go back to the individual program listing and inspect every line for data declarations to be subtracted from the total.

The declarations were in decimal. The sizing was in hex.

Squatter's Plight

Whitney sagged to his haunches in the program library, staring at that six-foot stack of hexed listings. He knew what Rumley *really* needed. The kind of sizing data he had asked for went into project productivity calculations — things like instructions per programmer per man-month, cost per instruction and management stuff like that.

An eternity passed by in the five minutes Whitney sat like that. With a deadline 24 hours away, five minutes of haunch-sitting was an unwise expenditure of what Rumley liked to call "time resources." For Whitney, however, it was the smartest five minutes he ever spent.

If getting the numbers was, even by a more reasonable deadline, an impossibility, then who would ever be able to prove any numbers he came up with wrong? Whitney mused. Some estimating scheme might do the job . . . .

An hour passed, with Whitney doing hex to decimal conversions on all the appropriate material in the top listing binder. Another hour passed, and Whitney had an accurate instruction/data size breakdown for the binder.

Then Whitney did a strange thing. He took a ruler and measured the edge of the binder. Then he measured the height of the six-foot stack. Finally, he formed a ratio of instructions per inch of listing and multiplied by the height of the stack. And voila! Two and a half hours into his impossible job, Whitney had the answers.

Well, not *the* answers. *Some* answers. But who could ever contradict them?

It was sheer coincidence when Whitney encountered Dogged in the men's room. Somehow it seemed an appropriate place to hand them over.

"Oh, by the way," Whitney said with nary a blush, "here's that sizing data you asked for. Getting it wasn't nearly as hard as I originally thought."

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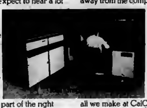

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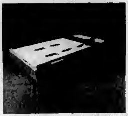

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Nodal Systems May Revolutionize Operations

(Continued from Page 27)

testing in much the same way that line-by-line testing provides scientific-style programming in the traditional mini and micro areas.

Nodal Procurement

Procurement personnel will not normally be involved with the small-scale shipping of files and programs between nodal computers. But they will be interested in the ability to safeguard vital production other than by buying the needed amount of hardware twice and having it delivered months or often years early. Nodal programming puts a premium on the ability of systems to run each other's programs without any problems and on no notice to speak of, so that shipping the day's load around is not only possible, but reliable.

Of course, not everything that nodal computers will provide will come quickly. The commercial world's software does not have the compiler support or the productivity-improving tools that are commonplace in the micro world. Similar ones will have to be developed, and this will take time.

However, the power of simple movement and stringent compatibility are already basic to nodal system architecture. The programmer at his terminal can build and use nodal facilities so much more effectively that the difference between nodal and traditional programming will be as basic as the difference between terminal coding and paper coding.

As for future differences — use your imagination. I'll report them when I hear of them, and I don't expect to wait too long, either.

So the concept of the computer as a basically independent entity is gone, and the idea of communications as an add-on feature is going.

Nodal systems are here and are beginning to make changes in just about every DP area. Be ready for them.

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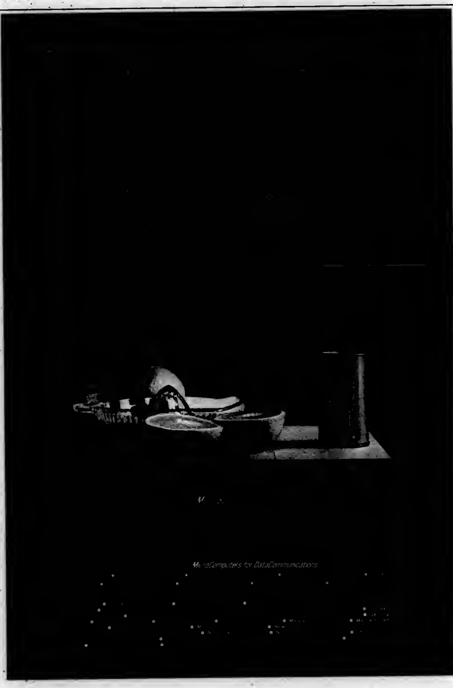

Open Letter To Bank

(Continued from Page 25)

system. Certainly that ought to be eliminated immediately — it is almost as incongruous as to charge depositors separately for bank robbery insurance. But that is only part of the problem.

I urge you to pioneer in restoring confidence in your own checks and, by contagion and the pressures of competition, in those of other banks. A strong public relations campaign is an obvious necessity and would do the Bank of America image so much good it would easily pay for itself.

Merchants who bank with you should be encouraged, by paper propaganda and face-to-face canvassing, to compare signatures. Or you might be much more radical and abandon the guarantee card, substituting legal acceptance of limited ($100) liability if a driver license is carefully examined — that is, signature and photograph compared.

Most of all, the pursuit and prosecution of offenders should be stepped up, both via the police power and through private banking forces. I repeat, Mr. Clausen, you must not let the public lose confidence in or become angry at banking practices, or your bank — and my computer trade — will never be able to persuade consumers and legislators to adventure into less-paper electronics.

But more important still is the moral obligation: you and other bankers persuaded the public to go from cash to checks; you owe it to them to see that those checks work!

Very sincerely,
H.R.J. Grosch

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Users Offered Choices

DEC Boosts Mini Software Support

By Don Leavitt
CW Staff

MAYNARD, Mass. — Well-known as a vendor with an ability to "push iron out the door," Digital Equipment Corp. is now beefing up its support of the software needed to make the iron useful.

In the latest of several moves, the company has announced expanded warranty policies and new contract services for its minicomputer-based software products including operating systems, programming languages and utility packages.

There are several levels of service being offered. Since they apply separately for each type of software, users will be able to "mix and match" the support to meet their particular needs, a spokesman said.

Non-ASK Coverage

Earlier this year DEC introduced its free Application Software Kit (ASK), essentially a catalog service designed to put package developers and users in touch with one another [CW, Feb. 5].

The new support includes an expansion of warranty service to cover more than 150 products. This service covers DEC-supported products not listed in the ASK and includes automatic delivery of software updates released during the 90-day warranty period.

For selected products, the new service also includes use of a toll-free telephone support line for the initial 90 days. In either case, DEC will continue to provide installation service, on-site support, technical newsletters and a performance-reporting service, the spokesman said.

Beyond the warranty period, services range from a comprehensive Decsupport — which provides a continuation of warranty-level support with visits for preventive maintenance of covered software — to a minimal Software Product and Documentation Update service under which self-maintenance customers can acquire individual updates on request.

The contract services cover major software for the PDP-11 and VAX-11/780 systems, but not the mainframe-sized Decsystems. Service contracts carry monthly charges and apparently are on a month-to-month basis at the discretion of the user.

Telephone Support

The centralized telephone service will be available for RSTS/E, RSX-11M and VAX/VMS warranty and service contract customers in the U.S. and Canada. Beginning Oct. 1, users at those sites can call into DEC's telephone support center in Colorado to ask questions about usage or more significant software problems.

Centralized telephone support is a part of all Decsupport and Basic Service for Software agreements. In addition, Decsupport provides scheduled visits for preventive maintenance, on-site remedial support, delivery of software updates and program change orders and a performance-reporting service for customer feedback.

Basic Service for Software includes delivery of updates, program change orders in machine-readable form, newsletters and performance reporting.

The cost of the service varies with the level desired and the product being supported, the spokesman explained. The support for RSTS/E, for instance, will range from $91/mo for a Binary Program Update Service — to $400/mo for Decsupport.

'Thruput' Aids Production Plans

CINCINNATI — Thruput is a general-purpose simulation program developed by Automated Decisions Corp. (ADC) for use in production planning. Written in Fortran, it can be installed in-house or accessed through the General Electric network.

The program helps industrial or manufacturing engineers, plant schedulers or analysts get improved throughput from production systems, a spokesman claimed. The software predicts the output of production systems composed of operations separated by buffers or in-process inventories, he explained.

By varying operation rates, availabilities, buffer sizes or system configuration, the user can find ways to improve the throughput. Because it is a general-purpose program, Thruput can be applied to small- or large-scale systems for either continuous or discrete production, the spokesman added.

Candidates for Simulation

In general, any system whose flow can be diagrammed as a series of operations and buffers can be simulated. Operations are defined by their rates and downtimes characteristics; buffers are defined by their maximum capacities.

Output from the simulation shows how each operation affects the production of others. A tabular report shows the time each operation was stopped for lack of input or lack of room for its output.

Another report shows each operation's actual throughput and its optimum capacity. A column of utilization factors shows how much of this capacity is being realized.

Thruput's quick calculation algorithm is said to be a major factor in making this package different from most general-purpose simulators. It is triggered only when the system changes out of a steady state operation.

Source code for Thruput is available for $2,000, ADC reported from 5721 Dragon Way, Cincinnati, Ohio 45227.

'DBAid' Backs IMS Installations

HERNDON, Va. — The DBAid for IMS package, now available from CACI, Inc., extends IBM's TSO 3270 Display Support and Structured Programming Facility (SPF) and increases the productivity of systems development and data base administration (DBA) personnel, a spokesman said.

The package provides easy-to-use, standardized interactive access to a set of software functions that allow the design and implementation of IMS data bases and applications in a fraction of the time and effort that would be required without it, he explained.

By integrating a variety of IBM software packages under a common "forms-driven" syntax and by providing on-line documentation through "help menus," DBAid helps reduce IMS learning time, decrease testing time and enhance reliability.

Designed specifically for the IMS data base/data communications shop, DBAid for IMS includes almost 500 on-line menus supporting the execution of compilers, IMS control-block generation, data base manipulation and program tests in both TSO-interactive and batch modes.

Under DBAid, interactive executions of DBA functions are logged on a sequential data set in real time, providing an audit trail of the activity. This log contains the library name, control block type, control block name, date and time of execution and TSO user identification, CACI said.

DBAid allows the creation of separate IMS environments for application development, testing by the DBA, training and production. It does this by supporting multiple levels of IMS control block libraries.

DBAid for IMS costs $35,000 and includes a week of on-site support after two days of training. Rental terms are also available, the spokesman said from CACI's Data Base and Information Services Division, 2579 John Milton Drive, Herndon, Va. 22070.

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Technical Writer Charges

IBM Text Editor Puts Users 'Behind Times'

By Nancy Scott Damren
Special to CW

When I consider IBM software, I wonder what happened to the Kiss — Keep It Simple, Stupid — rule of programming on which I was brought up as a very junior programmer.

A case in point is the updated Automatic Text Management System (ATMS-II), an extremely overprogrammed and, in my experience, overcomplicated text editing package that apparently was coded to baffle the user with a typical bovine end product.

Small wonder so many text-handling installations are buying from Wang Laboratories, Inc. or Digital Equipment Corp. and looking at IBM's product (?) in open-mouthed disbelief. Why does something so simple have to be implemented so cumbersomely?

I am now a software technical writer who has access to ATMS-II, but I prefer the relative primitiveness of the typewriter because ATMS-II is a pain where a pill cannot reach. Having had programming experience, I can't understand what is so difficult about keeping a task handler plain and simple and, more important, usable.

It's perfectly possible to create a character-oriented text handler "with powers beyond those of mortal man." DEC has done it — twice! So has Honeywell, Inc. So has Wang, for all I know.

What's IBM's problem? Can't its programming staff code a character-oriented text editor with free-form lines and do it simply?

It would seem the answer is "no." The box shows some examples of typical text editing commands and how IBM's ATMS-II and DEC's Teco implement them.

Command:	ATMS-11	Teco
character delete	unit #; character CR	d
line delete	la (but possible only if line length equals unit length	k
move pointer n spaces	Unit #; text preceding new position	nc
insert a word	unit #; new text	inew textESC
set tabs	----t----t----t----t	t 5, 10, 15, 20* (use tab key in text)

*Properly speaking, this is a Runoff (text formatter) command. Teco uses 8-character tabs by default.

Typical Text Editing Commands

Note how much simpler Teco is to use than ATM-II, even to accomplish these simple tasks.

Please note that I do not work for DEC, so I can't be accused of partisanship in that comparison. All I want to show is that IBM is far behind the times as far as text editing is concerned. Small wonder "Superman: The Movie" clearly showed a DEC VT-52 CRT terminal and an LA-36 Decwriter printer in the Daily Planet scenes.

Superman, where are you when we need you? As Lois Lane said, "That's the trouble with men of steel: there's never one around when you need one."

Bless you, Lois, I couldn't have said it better myself.

Damren is with the technical communications function at Foxboro Co., Foxboro, Mass.

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On-Line Dictionary System Backs Uniform Terminology

ENGLEWOOD CLIFFS, N.J. — Personnel in virtually any industry that has its own terminology or jargon, especially one in which standard definitions of the specialized terms is important, may be able to use an on-line dictionary system now available from Resource Software International, Inc. (RSI).

Written in Basic for the Hewlett-Packard Co. HP 3000, the Data Control Dictionary package is completely tutorial and can be used to build "any number of vocabulary files," according to an RSI spokeswoman.

The system enables a nontechnical user to enter and retrieve terms and meanings unique to his business, add new terms, edit existing terms and delete entries as they become obsolete. At the user's choice, material retrieved can be printed in hard copy or displayed on a CRT terminal screen.

Since source code is distributed to package buyers, they should be able to make the adjustments needed to run the dictionary on any CPU that supports Basic. The package, including source code and documentation, costs $250 and can be ordered from RSI at 140 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Text Handled Under AOS With Intermetrics Package

CAMBRIDGE, Mass. — Scribe, a text processing system that runs on Data General Corp. Eclipses under the Advanced Operating System (AOS), is available from Intermetrics, Inc., providing the large-scale minicomputers with a capability not normally available in a DP setting.

Intermetrics claimed Scribe provides features not offered by other text formatters. In addition to standard features such as right and left justification, page numbering and centering, for example, the software offers an automated table of contents, an index, footnoting and support for superscripts and subscripts.

Scribe provides modular document construction, a spokesman said. The user can deal with chapters separately but still get a unified table of contents.

The software can take advantage of the high-quality printing capabilities of such units as a Diablo 1620 terminal, the spokesman continued.

Scribe uses a full 32K-byte AOS region and costs $1,000. An introductory manual is available separately for $10, the vendor said from 701 Concord Ave., Cambridge, Mass. 02138.

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Linked Software May Lead to Automated Plant

By Tom Henkel
CW Staff

PEORIA, Ill. — Scientists here at Bradley University are working to combine four design and manufacturing software packages into one integrated manufacturing system.

The scientists hope that when the full system begins running sometime next year, it will be able to handle a full manufacturing cycle — from conceptualization to production of a finished product, according to Dr. Gustav Olling, chairman of the Department of Manufacturing.

If the project is successful, it will mark the first time a full manufacturing cycle has been automated, Olling said, and will be the initial step to a truly automated factory.

That first step will be linking the four software packages to Bradley's Control Data Corp. Cyber 171. Three of the software packages were originally designed for non-CDC hardware, Olling noted.

The four software packages are Tips, a geometric modeling package developed in Japan to run on Japanese hardware; Computer-Aided Process Planning (Capp), developed by Computer-Aided Manufacturing International (CAM- I) on IBM hardware; APT-IV, a geometric analysis package, and Autap, a process planning package developed at the University of Aachen in West Germany.

When fully implemented, conceptual design will be handled by Tips, analysis by APT-IV and planning and implementation will be carried out via robot-type tooling machines governed by Capp and Autap.

"Industry is searching for this kind of system. These systems exist as Band-Aids in their own right, but they've never been linked. This model will demonstrate this kind of interlinking is possible," Olling said.

Bradley has APT-IV working on its CDC mainframe and is in the process of implementing Tips. Autap was developed on a CDC Cyber 171, so Olling doesn't expect many problems with it.

Stumbling Block

The biggest stumbling block to date has been converting Capp to run on the Cyber CPU. The effort has been significant, but not overwhelming.

"The operating systems are distinctly different. It has caused some problems in word length and single-precision vs. double-precision arithmetic and so forth. We'll have to do a little modifying," Olling said.

Advent of Robotics

"The kind of stuff we're doing has been generated by a lack of skilled workers. We're talking about bringing robotics into a lot of tasks humans do today," Olling said.

"We would probably be replacing hundreds and hundreds of jobs. You replace mundane kinds of operations, but you create jobs for a different breed of people to maintain, diagnose and develop software for those systems," he added.

Introducing Bradley students to the integrated system is expected to give them an edge on future jobs in manufacturing. "We expose students to a mix of computer programming languages because we believe future technological skills will require formatting input and output data along mathematical lines," Olling said.

'PMS' Ensures Smooth Operation For Policy Production and Control

By Tom Henkel
CW Staff

COLUMBIA, S.C. — You don't have to be in the insurance business long to be swamped in paperwork, but for the large insurance company the swamp can quickly turn into a quagmire.

An insurance vice-president here thinks he has found a way to solve the problem. The Policy Management System (PMS) — the brainchild of Larry Wilson of Seibels, Bruce & Co. — reduces the number of forms used in processing insurance policies and claims to about seven.

The software package can be implemented on anything from an IBM 370/115 to a 3033 and it does not require hardware or software modifications, Wilson said.

"The primary implementation involves loading up tables and reference files. Those are the parameters that drive the system. Converting data from other systems is at worst a manual conversion and at best a program-to-program conversion," he explained.

Seibels, Bruce, which handles about 3.5 million policies at its own data center for 15 large companies, has already leased PMS to about 120 companies in the U.S. and Canada.

'Universal' Form

PMS is based on what Wilson calls a "universal" insurance form. The same basic form is used to process automobile, homeowners and commercial insurance policies. Billling for the different types of policies is done in the same manner — on a single form.

Since the system was installed on Seibels, Bruce's 370/168, operating costs have dropped 6%. Other underwriters using the system have realized up to a 25% increase in employee output, Wilson claimed.

"We're much more productive because the computer handles rating and policy preparation and allows fast data entry and retrieval," he added.

But PMS is not for everyone. Before a company can really profit from the system, it must do a minimum of $5 million to $8 million in insurance premiums.

Not Foolproof

Nor is the system foolproof. Data entered into the system comes from standard insurance forms circulated by salesmen in the field. When returned to the company's input site, that data is then transcribed onto a facsimile of the insurance form reproduced on a CRT terminal.

Data entry mistakes at this stage could slip into the system unnoticed, Wilson said.

An error detection phase in the data transmission segment will block entry of inappropriate data — such as the amount of coverage in the space for the client's name. This, Wilson said, catches 90% of the data entry errors.

Mistakes that slip through the error detection phase often show up in batch processing, where error messages are used to flag inconsistent entries, according to Wilson.

Once data is entered and verified, the system automatically calculates the rate and premium. Declarations of what is covered by the particular policy are then prepared.

This preparation eliminates about 41% of typing costs and half the data entry and coding costs, Wilson said.

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Hewlett-Packard Computer Advances

Volume 4 Number 4

Keeping manufacturers competitive in the 1980s

Fiber optics makes light work

Lifting the ceiling on productivity

Today's manufacturer, faced with the growing need to increase efficiency and productivity while at the same time reducing costs, is finding it increasingly difficult to remain competitive without turning to some sort of on-line computer information management system.

In the **engineering** department, computers of all sizes are being used at every stage of product design and development to solve technical problems.

On the **manufacturing floor,** computers from desktops to minis to larger systems are being applied to such tasks as machine and process control, materials and production management, warehousing, and shipping.

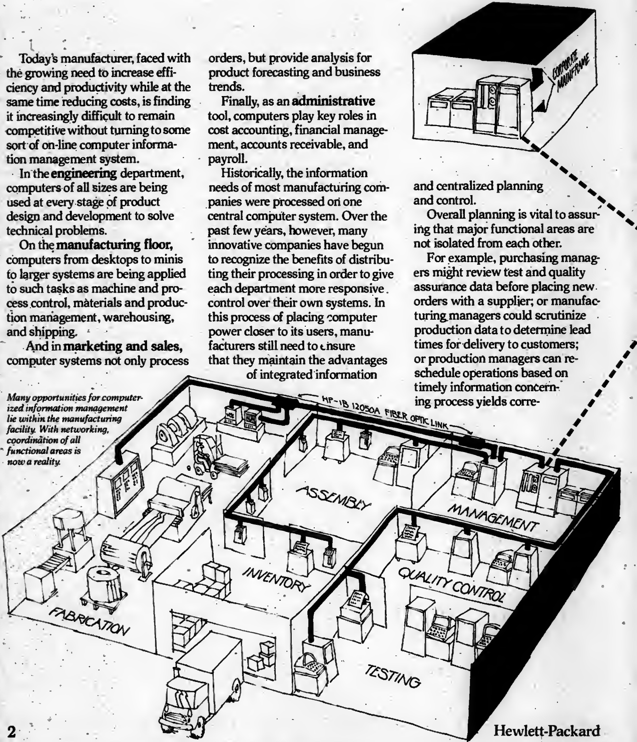
And in **marketing and sales,** computer systems not only process orders, but provide analysis for product forecasting and business trends.

Finally, as an **administrative** tool, computers play key roles in cost accounting, financial management, accounts receivable, and payroll.

Historically, the information needs of most manufacturing companies were processed on one central computer system. Over the past few years, however, many innovative companies have begun to recognize the benefits of distributing their processing in order to give each department more responsive control over their own systems. In this process of placing computer power closer to its users, manufacturers still need to ensure that they maintain the advantages of integrated information and centralized planning and control.

Overall planning is vital to assuring that major functional areas are not isolated from each other.

For example, purchasing managers might review test and quality assurance data before placing new orders with a supplier; or manufacturing managers could scrutinize production data to determine lead times for delivery to customers; or production managers can reschedule operations based on timely information concerning process yields corre-

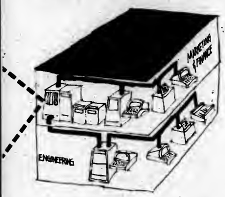


Many opportunities for computerized information management lie within the manufacturing facility. With networking, coordination of all functional areas is now a reality.

lated with the production plan.

Today, some computers are capable of integrating these distributed functions via networking, providing a consistent information system solution.

Hewlett-Packard has a broad range of products that include a variety of networkable computers, software, peripherals, and instrumentation. As a result, integrated information systems can now be planned to increase productivity in all areas of manufacturing companies, and provide all the benefits of distributed processing while still allowing centralized coordination.



Light—years ahead

Fiber Optics, a technology considered to be tomorrow's data communications technique, has already been incorporated by HP into its 12050A Fiber Optic Link—the first HP-IB (HP's IEEE 488 interface standard) optical data transmission device ever.

Manufacturers can now benefit from the many valuable advantages offered by this technology, which include electromagnetic immunity, safety within explosive environments, high speed, and remote instrument communications.

With the Fiber Optic Link, a user can transmit data through the most severe surroundings imaginable with total electrical isolation, providing complete immunity from noise.

This means that fiber optic cables can operate in the presence of both electrical fields (high voltage, switches, relays, lightning, etc.) and magnetic fields (rotating machinery, transformers, etc.) without being affected by spurious electrical spikes that endanger data being carried to a computer. And since no electrical energy is being transmitted by the Link, even if damaged it is safe to use in an explosive environment.

This makes the 12050A an excellent way to transmit data between an HP1000 or HP9800 computer and remotely located HP-IB-compatible instruments. Not only can a single Link connect up to 14 instruments in clusters at distances of up to 100 meters (328 feet), but multiple Links can be used to connect many more instruments.

Under certain conditions, fiber optics can transmit data at rates up to 20 times faster than standard coaxial cable—vital in many real-time instrumentation applications. The data transfer is 20K bytes/second between an HP-IB device and the computer. Furthermore, the Link enables a computer to handle a service request interrupt (SRQ) from any remote device within 100 μs.

Hence, with the trend toward smarter and faster instruments, the Link provides a way to prevent costly, time-consuming communication bottlenecks. As a result, the 12050A Link is outstanding for today's growing computer-based instrumentation applications.

Highly reliable and easy to use

In application, two 12050A Link units must be used for each remote site. Dual channel fiber optic cable connects the two units. In this way, each Link functions as a transmitter/receiver, with HP-IB bit-parallel protocol automatically converted to bit-serial information for transfer over the fiber optic cable.

No special programming is required for operation of remote devices. HP-IB devices communicate programmatically via the 12050A units just as they would in local operation.

With the silicon-on-sapphire (SOS) microprocessor that is contained in each 12050A, data integrity is carefully maintained. If a transmission error is found (using a checksum comparison algorithm), retransmission automatically continues until the correct data byte is received.

As for durability, the fiber-optic cable has proved more rugged than conventional wire cables.

Seeing the light

For more information on how this new technology can apply to the manufacturer, **please indicate A on the reply card.**

Factory data collection: putting it to work

Now, factory managers can quickly and easily put together a real-time factory data collection system—without extensive and costly programming—tailored to a variety of specific user applications.

DATACAP/1000—HP's new applications software tool—enables you to build an interactive system that allows fast access to a continuing flow of accurate and timely factory information. The ability to retrieve data on critical production processes or procedures—at any time and in either display or hardcopy format—has created a "quality information" process. With this new capability, managers can now see problems as they arise, and take corrective action immediately to prevent situations that could cost the company much time and money.

With DATACAP/1000, all information is captured in real-time directly from the factory floor, and can be validated to ensure accuracy—resulting not only in lower information-handling costs, but in quality information upon which to base important production decisions. If it is available, information concerning every phase of production can immediately be at the fingertips of everyone concerned. No longer will the manager be flooded with too much data, or data that is unorganized or delayed somewhere in the system.

In short, DATACAP/1000 is an efficient means of keeping manufacturers alive and productive in today's competitive business world.

Hard-nosed software… the DATACAP approach

DATACAP/1000 is a data-entry software product designed for use with an HP1000 computer system. It enables users to process information collected by data-capture (HP3075/76) or timekeeping (HP3077) input terminals—as many as 56 per computer—in real time for immediate use. In addition, instrumentation can also be controlled by a single HP1000 through the HP-IB 12050A Fiber Optic Link or other local interfaces.

Using DATACAP/1000, slow and error-prone manual methods of recording data are eliminated, and gathering of information is not only up-to-the-minute, but accurate and cost-effective. And, for even more powerful data processing, distributed systems networks (DSN) can be established to communicate between HP1000 and HP3000 systems.

When combined with IMAGE/1000—HP's data-base management software—DATACAP/1000 is able to organize the continuous flow of up-to-date manufacturing and work data to generate automatic status

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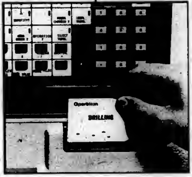
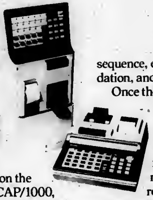


OPERATION?

reports on either CRT display terminals or hard-copy line printers.



How it works

There is no turnkey solution applicable to all problems on the factory floor. DATACAP/1000, however, can be easily tailored to meet most user requirements. And once placed on line, it requires no special programming expertise to operate.

To adapt DATACAP/1000 to a specific application, a user must define specifications for data-entry transactions that will represent the bulk of factory data processed by the manufacturer. This is accomplished through a simple, interactive process on a display terminal using plain language, and typically includes instructions for entry sequence, entry method, data validation, and storage.

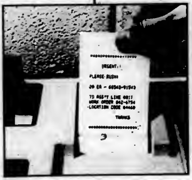
Once the user has designed all possible transactions that will be required (for example, one for inventory control, one for work-in-progress monitoring, and others representing different phases of factory production), a program is created through DATACAP/1000 that will continually monitor all or a portion of the many factory input terminals.

After the DATACAP/1000 programs have been established, data entry itself can be made at any one of the many input terminals deployed throughout the factory floor, using one of four input modes: a function/numeric keyboard, alpha-numeric punched (80-column) cards, mark-sense (pencil) forms, or type-III plastic perforated identity badges.

In addition to numerics, the keyboard includes 15 prompting lights to guide the user through each transaction, and 10 special function keys. Keyboard data is displayed on a 15-digit visual readout, which can also be used to display data being sent to the terminal from the computer. For hard-copy recording, a 50-lpm thermal printer is available. For security purposes, a code may be assigned to a user, allowing access to specific transactions only.

For each data transaction, temporary storage is provided until the user indicates that the transaction is complete. At that time, DATACAP/1000 records the data (along with the transaction number, terminal identification, data, and/or the time of day, if requested) on magnetic tape, cartridge disc file, the IMAGE data base, or a storage

Continued on page 8



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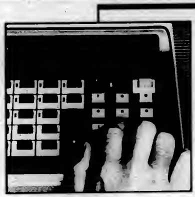


PART NUMBER?

Materials management made more manageable

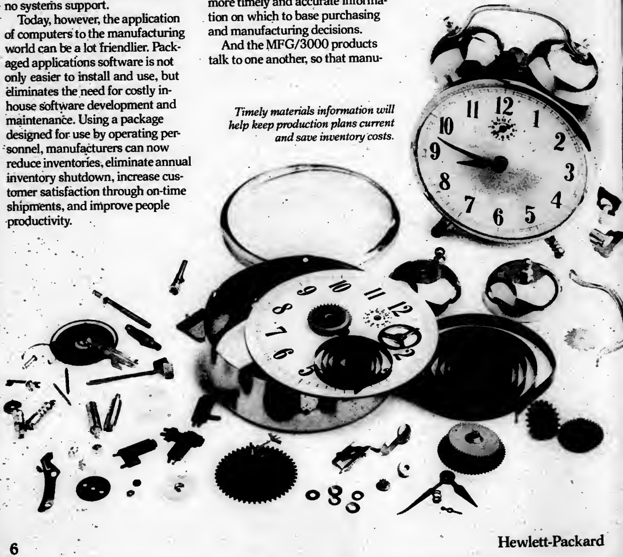
In the past, the users of material requirements planning systems were faced with a number of frustrating data processing problems: long turn-around time, inaccurate data, lack of good documentation, costly and inflexible software, long and difficult implementation, inadequate training, and practically no systems support.

Today, however, the application of computers to the manufacturing world can be a lot friendlier. Packaged applications software is not only easier to install and use, but eliminates the need for costly in-house software development and maintenance. Using a package designed for use by operating personnel, manufacturers can now reduce inventories, eliminate annual inventory shutdown, increase customer satisfaction through on-time shipments, and improve people productivity.

An integrated solution

Within the past year, Hewlett-Packard has introduced four software products—all part of MFG/3000—that help manufacturers to improve inventory management, control costs, and obtain more timely and accurate information on which to base purchasing and manufacturing decisions.

And the MFG/3000 products talk to one another, so that manufacturing users from more than one department now can communicate and use information collected from almost everywhere in the manufacturing operation, from engineering and assembly to inventory control and product planning.



Timely materials information will help keep production plans current and save inventory costs.

An important advantage of MFG/3000 is the ease and speed with which the user can enter, retrieve, and modify data via an interactive terminal. Easy-to-use HP CRT terminals are used to enter data on forms that resemble those typically used in materials planning and control departments.

On-line transaction menus are shown on the terminal screen to guide the user in making entries. If unsure of the proper entry to make, the user can initiate a "help" procedure, which will display information on the screen to assist in making the correct entry.

MFG/3000 was designed primarily for the manufacturer who assembles standardized multipiece products in lots, and includes the following products:

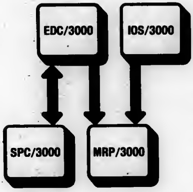
EDC/3000, the Engineering Data Control portion of MFG/3000, is used to maintain an IMAGE/3000 data base on every item in the materials inventory. This includes part numbers, product descriptions, costs, bills of material, standard routings, and engineering or materials changes.

With all data easily entered and edited on interactive CRT display terminals with specially formatted screens, EDC/3000 allows users to have high confidence in the accuracy of all information.

IOS/3000, HP's Inventory and Order Status product, maintains information in an IMAGE/3000 data base to manage the use of materials documented by EDC/3000.

By continually reviewing all data interactively, the user can predict and control inventory activity. And IOS/3000 will maintain a complete and accurate record of all on-line transactions affecting inventory balances.

In the event of exceptional inventory conditions, IOS/3000 will issue recommendations for corrective action well before the situation becomes critical.



MRP/3000, Material Requirements Planning, simulates the complex flow of material necessary to meet a production schedule.

Using bills of material, parts on order, and inventory status information provided by the other MFG/3000 products, and a company's master production schedule, MRP/3000 recommends a plan for material acquisitions that will satisfy that schedule.

If a particular material or component is in short supply, MRP/3000 either suggests an order to replenish the supply, or expedites an existing order.

SPC/3000 calculates Standard Product Costs—including material, labor, and overhead—of each subassembly, assembly, and finished product in a manufacturing operation. Based on the current costs entered into the EDC/3000 data base, SPC/3000 establishes a standard cost for a product at each stage of its assembly.

With this product, not only is time saved in the calculation of a product's cost, but a manufacturer can simulate any changes in a production process before actual implementation of a new standard.

Each element of MFG/3000 has been designed to solve a particular manufacturing problem. To achieve a total solution to the materials management challenge, however, they should be implemented together to form an overall integrated materials planning and control system.

At HP, the expertise gained from years of manufacturing experience has been used to successfully develop an off-the-shelf software package to substantially enhance the management of materials planing problems. Tested and proven by use at numerous customer installations, MFG/3000 is quickly implemented and easy to use. It is truly a cost-effective approach to help increase the manufacturer's productivity.

If your would like more information on Hewlett-Packard's packaged applications software for materials management, **please check D on the reply card.**

A pacemaking mini network

The following story gives an example of how a manufacturer has successfully applied the technique of Distributed Systems Networking (HP DSN) in integrating manufacturing process applications:

A distributed processing network of three Hewlett-Packard 1000 minicomputers is the key to testing and quality assurance at Medtronic, the world's largest manufacturer of cardiac pacemakers.

"The HP system has helped increase the efficiency of our pacemaker testing by 400 percent," said Vern Menk, senior project engineer at the Rice Creek Facility in Fridley, Minn.

By using Hewlett-Packard's DS/1000 software to link the three computers, Medtronic has created a system it calls MED-NET (for minicomputer electronic data network). This system operates five stations for performing long-term life testing, low-volume qualification testing, and high-volume receiving-inspection testing of pacemaker components.

Other features of the network are shared resources and mutual backup among the minis, simultaneous, real-time test program development, interchangeability of the computers, and ease of interface with the HP-IB (interface bus) links.

One HP1000 is the central processor, which is used for program development, pacemaker life tests, and for checking out test hardware. This processor also stores test programs for downloading the two satellite computer systems currently testing about 40 different parts and devices. Seven other HP1000s are used by the company for other related purposes.

A portion of the data collected is transmitted to an IBM 370 system for archival storage and trend analysis.

The multiprogramming capability of the HP1000 allows simultaneous testing of both fast and slow-running device types, a feature not often found on test systems that are commercially available.

If you would like more information on HP Distributed Systems Network software, **please check E on the reply card.**

Factory data collection (continued)

medium provided by the user via a special subroutine.

DATACAP/1000 also provides other user features. For those requiring an audit trail for specific types of data, a logging of all pertinent transactions can be selected and recorded. To ease support and maintenance, documentation for each transaction specification can be provided.

For more information on HP's factory data collection software, DATACAP/1000, **please check B on the reply card.** To find out more about HP's durable, low-cost data capture terminals, **check C.**

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Training in the '80s — Part 1

DP Will Change, But Support Still Necessary

Written by the manager of the Boston office of Romac & Associates, personnel consultants, this article provides a basic picture of training and its palce in the DP scene of the next decade. In his next article, Bond comments more directly on the psychological makeup of the DP professionals who are to be supported by training.

By Robert J. Bond
Special to CW

Where will DP training take us in the 1980s? To answer that, we must ask the more fundamental question, Where is DP going in the '80s? In that light, certain facts emerge.

First, the role of DP is expanding geometrically. Five and 10 years ago, most people thought the truly explosive growth had taken place and the ensuing years would find more orderly expansion. In fact, growth in the more recent years has been even more startling than in the earlier days, and nothing indicates the pace will slow.

Second, the manpower appetite of DP has grown tremendously and gives every indication of remaining high. We have been in a "demand exceeds supply" posture in the personnel marketplace for some time and there is no sign this imbalance will soon change.

Predictions that programming as a function and a profession would become obsolete have proved groundless. Clearly, the trend is in the opposite direction, and good programmers today need to be smarter and better trained than their counterparts in previous years.

Trends Appearing

The basic DP trends of the '80s are beginning to appear. Distributed processing has shifted from a subject for discussion to a reality both in minicomputer networks and in intelligent remote stations of large central facilities.

The concept of and terminology for the data base have been with us for some years, and the '80s will bring that trend much further down into the medium and small computer class. In addition, the development of multiple large-scale systems around consistent and truly integrated data bases will continue. Other trends clearly include an increase in the use of sophisticated applications packages and the continued growth in the number and size of software service companies.

If one overall trend is apparent, it is that data processing itself has clearly become more businesslike. It is subject now to the kinds of productivity measurement, both in terms of production and cost absorption, as other departments in the company. In the old days, management considered DP practitioners an assemblage of either mystics or nuisances.

How then should an organization's training function service these new avenues and new forms? Obviously, there is a need for technical enrichment so the professional staff can use tools as the company embraces them.

Second, because of the increasing pervasiveness of computing throughout organizations, there is a corresponding increase required on proper user conceptualization. Emerging user communities must be taught what to expect and what not to fear from the DP function.

Lastly, because of the increasing emphasis upon businesslike measurability, a much more intensive training effort in the internal DP department must be undertaken in such areas as

(Continued on Page 46)

DP-Based Meets Set by Theorem

SAN JOSE, Calif. — Theorem Institute presents seminars on subjects of current interest in the areas of criminal justice, law enforcement and general government. Two of the courses on this autumn's schedule focus on DP.

"Information Systems — Current and Future Implications for Law Enforcement" is the title of a seminar to be presented by Theorem at the Granada Royale Hometel in Phoenix Oct. 12.

Described as a course for the executive, it will focus on the state of the art in computer systems and will examine the policy decisions and choices available for planning and pursuing the effective use of computers. The seminar costs $50, a spokeswoman added.

The following week, "Computer Planning," a course covering the implementation of computer systems in small- and medium-sized law enforcement agencies, will be offered by Theorem at the Monteleone in New Orleans. Scheduled for Oct. 15-17, it carries a registration fee of $255.

More information on these and other seminars is available from Theorem Institute, 1782 Technology Drive, San Jose, Calif. 95110.

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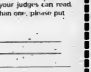
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Every year, as all you button freaks know, Computerworld distributes tens of thousands of buttons (at no cost, we like to point that out) at NCC, the Computer Expos and other trade shows across the country. A whole generation of computer people have come to look for those buttons, and they have become a tradition in the industry.

This year, we're going to give you a chance to participate in the tradition. We're looking for good button suggestions — funny, relevant and at least moderately clean — for consideration by our experienced panel of judges. (Examples of buttons we've used are shown.) As many as six suggestions will be chosen by our judges (based on criteria known only to them), and if your entry is among those picked, you will receive a certificate of appreciation suitable for showing off to your friends.

In addition, all the people who submit winning entries (including all duplicate entries) will be thrown into a hat (or at least their entries will) and six lucky winners will be drawn more or less at random (we never said the judges were fair). These six lucky souls will receive a free hand-held computer game valued at well under $100 if we can do it.

You may *not* enter as many times as you like because we know you have computers and can run off huge numbers of entries which will drive us crazy. So only two entries are permitted per person and all entries must be received on the official order form or a copy thereof. All decisions of the judges are considered final, and no representation as to their competence, skill or fairness are being made. Deadline for entries is November 15th 1979 in our offices in Newton.

Yes, I'd like to enter Computerworld's ridiculous button contest. I hope your judges can read. Here is my entry (if you have more than one, please put them on separate forms).

____

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Send to: Jack Edmonston, Sales Promotion Department, Computer Business News, 797 Washington Street, Newton, MA 02160

Listings Welcome

WHITE PLAINS, N.Y. — To update its Agency Automation Guide (AAG), the nonprofit Insurance Institute for Research (IIR) has issued a call for all software and turnkey vendors targeting insurance users to submit information about their products.

The guide was first published in mid-1978 as a reference book to help property and liability insurance agents and brokers determine their DP requirements and plan for the acquisition of services or in-house systems to fulfill those requirements.

Vendors in the original AAG have been sent questionnaires to make sure that the information is current. But an IIR spokesman noted there may well be other vendors in the market, and the call for information now is intended to ensure all have the opportunity to be listed.

To be included in the guide, a vendor must provide generalized programs — preferably on a turnkey basis — covering accounts receivable, accounts payable and general ledger processing for insurance agents or brokers.

There appear to be no restrictions on the type of equipment or mode of operation for the software.

More information on the guide which will sell for $42.50 once it is updated — is available from the IIR at 222 Mamaroneck Ave., White Plains, N.Y. 10605.

Support More Important As DP Operations Change

(Continued from Page 45)

project management, structured design and structured programming.

Why should a DP department have a training effort in the first place? The first answer is fairly obvious. A training department can direct skills capability toward productive effort. It can also enhance existing staff capability to increase productive output.

Create Atmosphere

In addition, training can create an atmosphere enabling the organization to retain valuable employees, and it can create one that will facilitate the recruitment of additional employees.

From a perspective of many years in the personnel business, we have been able to develop an understanding of the elements that go into a company's reputation and recruiting image. The most fundamental one is the belief the company is willing to invest in its people.

This investment can take a variety of forms, ranging from the structure of benefit packages to the physical accoutrements of the workplace. One of the attitudes most often looked for by DP professionals is a willingness to provide the potential for growth through professional training.

Also inherent in the fabric of a company's reputation is promise-keeping. One of the most productive self-audit techniques a training or personnel department can use is asking recent attendees simple questions: Have you received the training you expected or the training you were promised consistent with the schedule you were given?

Infotech Offers Graphics Course

LONDON — Infotech International Ltd. has scheduled a conference on computer graphics, to be held here Oct. 29-31 under the chairmanship of Robert Dunn of the Communications Research and Development Command of the U.S. Army.

A tutorial on raster graphics, intended to complement the conference, will be presented Nov. 1-2. Leading this program will be Ed Catmull, director of the computer group of California-based Lucasfilms.

The first conference has a registration fee of $900 or 340 British pounds while the tutorial under Catmull costs $600 or 230 British pounds, he added.

Infotech International is at Nicholson House, Maidenhead, Berks. SL6 1LD, England.

User-programmable intelligent terminals for distributed processing, data communications and even standalone applications **from $4500.***

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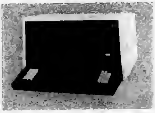

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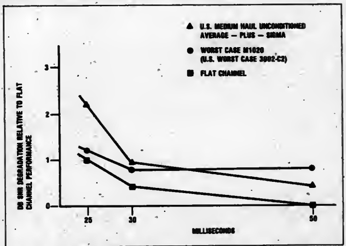
Fast-Poll Modem Standard in the Works

By Dale Walsh
Special to CW



With General Datacomm's fast-poll V.27 modem, a Type 3002 channel with C2 conditioning is reportedly "almost completely" equalized after 25 msec. Even with a medium-haul unconditioned line, the performance after the 25-msec fast-poll sequence is said to be only 2dB worse than after the 50 msec sequence required by a standard V.27 modem.

Users planning a multipoint network operating at 4,800 bit/sec should know about the standards effort under way to assure compatibility among fast-poll modems (faster than the 50 msec Bell 208 or V27 modems) operating at that speed. Otherwise, 4,800 bit/sec modems selected today could be incompatible with tomorrow's standardized fast-poll models.

The need for a standard to govern fast-poll 4,800 bit/sec modems was first identified last November at the Consultative Committee on International Telegraph and Telephone (CCITT) Study Group XVII meeting in Geneva, Switzerland. The matter should again be discussed this month; working parties of the study group have assembled in Boulder, Colo., for a nine-day meeting that began Sept. 11.

CCITT is the body within the International Telecommunications Union (ITU) responsible for studying technical, operating and tariff questions relating to telephony and telegraphy and for issuing recommendations. Although the technical standards established by these recommendations are not officially binding on ITU members, they nevertheless largely govern the operations of the world's telecommunications systems.

CCITT recommendations are developed by 18 study groups, each of which covers a particular specialty. Study Group XVII deals with data transmission over telephone and Telex networks. Since its formation in 1960, the study group has dealt chiefly with modem modulation techniques and associated interfaces with data terminal equipment, producing the V series of recommendations.

In 1977, CCITT issued Recommendation V.27 for transmitting data at 4,800 bit/sec over voice-grade telephone channels. The "standard" is divided into two parts: "V.27 bis" for private line use and "V.27 ter" for operation over the public switched network.

Both use the same eight-phase modulation, differential encoding and scrambling technique and are thus line-signal compatible. Two selectable training preambles for receiver synchronization are specified: 50 msec and a 708 msec sequence.

Even with 50 msec training, however, the V.27 modem is handicapped in multipoint applications because it frequently does not offer enough throughput improvement over the faster synchronizing 2,400 bit/sec V.26 modem to justify the extra complexity and cost. What users need is a 4,800 bit/sec modem with speedier synchronization, a so-called "fast-poll" modem.

Three Designs

Recognizing this need, three U.S. modem suppliers, Codex Corp., Racal-Milgo, Inc. and General Datacomm Industries, Inc., presented their fast-poll modem designs in Geneva. The designs differ markedly in their approach to fast synchronization, so the first step in deriving a standard will be to select the optimum approach.

There are three techniques for speeding receiver synchronization in polled multipoint systems:

- Storing the equalizer information for

(Continued on Page 50)

Voice Response Unit Answers Touch-Tone Data Base Queries

SAN DIEGO — DP users can reportedly add to or query remote data bases from a conventional Touch-Tone telephone with a general-purpose audio/data communications processor recently announced by Wavetek Data Communications.

The ADC2000 can "answer" queries via voice response, visual displays or hard-copy output; it accommodates as many as 256 separate telephone lines, Wavetek claimed. The processor was developed for applications in which a data base is accessed by a large number of calls each day from a large number of terminals and in which the response to an inquiry or entry is "short and straightforward."

Users that already possess Touch-Tone telephones can employ them as audio response system terminals without increasing operating costs, Wavetek stated. The ADC2000 is pegged for such applications as banking (pay-by-phone and credit verification); data entry; reservations; order entry; and manufacturing control.

The ADC2000 consists of Wavetek's ADC1700 control unit and one to eight of the vendor's ADC1500 terminal controllers. The processor's design reportedly allows the user to place the terminal controllers where the calls originate; the control unit can stay at the central computer site.

The system's modular construction features built-in redundancy to minimize the effects of any component failures, according to a spokesman. The ADC1500 can go directly to the transmissioo control unit if necessary, he explained, adding that if the host CPU goes down, the ADC1700 can take over.

(Continued on Page 50)

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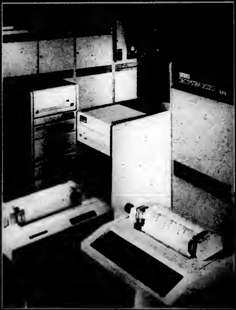

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We also offer a range of configuration possibilities within the PDT-11 family itself, including the PDT-11/130, with tape storage, and our downline-loadable intelligent terminal, the PDT-11/110.

In short, when you use PDT-11/150's as your basic networking terminals, you can build up or down—wherever your application takes you—without ever outgrowing your existing components.

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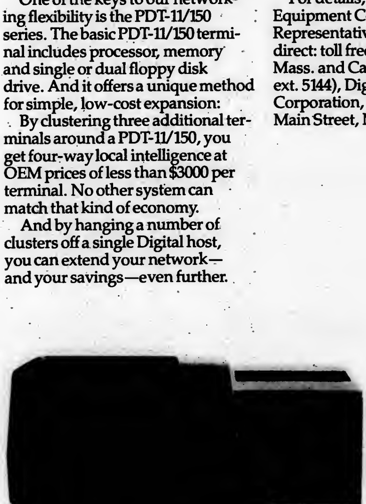

digital

Wavetek Supports Voice

(Continued from Page 47)

The microprocessor-based ADC1500 performs I/O operations on up to 32 telephone lines simultaneously. The controller translates Touch-Tone signals into digital input, receives and buffers commands from the host CPU, translates the commands into voice response from a 940-word vocabulary and handles terminal multiplexing and message transmission via a single serial communications channel.

The ADC1500 includes Wavetek's Model 1407 data set receiver, which digitizes the multifrequency Touch-Tone input and converts this information into a form appropriate for terminals within the user's network, the spokesman said. The 1407 also features a dial-out referral capability to an assistance operator under the host CPU's diretion. The data set transfers calls to the assistance operator if the host CPU crashes.

Based on Digital Equipment Corp.'s PDP-11 minicomputer, the ADC1700 can act as a front-end processor or as a stand-alone data collection center, the spokesman continoed. In a stand-alone environment, the control unit manages the ADC1500 and collects data on disk or magnetic tape for later processing.

The ADC1700 includes a floppy disk for program loading and a DEC Decwriter II teleprinter for console control and data logging.

The ADC1700 can be connected to the host CPU in three ways: as a direct attachment to an IBM 360 or 370 byte multiplexer channel — allowing the ADC2000 to emulate a standard IBM 7770 audio response unit; as a single 9,600 bit/sec bisynchronous link to a terminal controller already on the channel, allowing multipoint communications; or directly through a 9,600 bit/sec bisynchronous link.

An ADC2000 configuration with one ADC1500 costs about $80,000, while a fully extended configuration with eight ADC1500s can cost up to $600,000.

Wavetek is offering nationwide field service support for all its systems, the spokesman noted from 9045 Balboa Ave., San Diego, Calif. 92123.

Modem Standard Planned

(Continued from Page 47)

each drop and retrieving it to begin receiver synchronization for the next poll.

- Using 2,400 bit/sec transmission initially for faster synchronization and then switching to the 4,800 bit/sec rate. The Codex design uses this speed-switching technique.
- Using direct fast training at 4,800 bit/sec, which effectively is a speeded-up version of the 50 msec V.27 approach. The Racal-Milgo and General Datacomm modems both employ this technique.

With the direct fast train appraoch, there is an implementation choice between cyclic, impulse and pseudo-random sequence training. Cyclic training involves transmitting a repeating pseudo-random pattern whose length corresponds to the nomber of equalizer trains by recycling the received pattern at several times the normal transmission rate.

Racal-Milgo's design employs impulse training: one or more modulated impulses are transmitted, and the receiver processes an algorithm that converts impulse samples to equalizer tap coefficients.

In the third approach, a pseudo-random training sequence is transmitted and the equalizer trains by large iterative adjustments. General Datacomm favors this technique because it does not require the high-speed processing associated with cycling and impulse training.

In fact, the basic circuitry and techniques used in the conventional V.27 bis design can be readily extended for fast-poll operation. Users benefit since the fast-poll feature can be incorporated as a V.27 bis option rather than requiring a different type of modem.

General Datacomm has field-tested, under a variety of operating conditions, a fast-poll V.27 modem that trains in 25 msec and uses the direct fast train approach with a pseudo-random training sequence. When polling over an average unconditioned medium-haul line in the U.S. the modem performance after the 25 msec fast-poll sequence was only 2dB worse than after the full V.27 50 msec training sequence (see figure).

Further, when polling over an international M1020 circuit or a domestic Type 3002 line with C2 conditioning, the channel was almost completely equalized in 25 msec.

Besides offering the fast-poll feature as an integral option, General Datacomm's microprocessor-controlled modem permits V.27 bis operation over two- or four-wire private lines and V.27 ter operation over the switched network. The unit offers two-call, dial back up capability.

The modem can also be made compatible with Bell 208 modems, again offering the additional benefit of a 25 msec fast-poll option.

The General Datacomm modem includes automatic detection of long or short training sequences, unattended fallback to a 2,400 bit/sec data rate and an optional 150 bit/sec secondary channel. In fast train multipoint applications, a modem can be configured as either the out-station polling unit or the in-station polled unit.

The use of multipoint services at 4,800 bit/sec is increasing rapidly. As this growth continues, there is an accompanying need for a standard to assure capatibility among various fast-poll modem manufacturers.

General Datacomm has recommended a fast-poll adaption of the CCITT V.27 bis training sequence, which is simple enough to be implemented as a V-27 bis modem option. Extensive training has shown that a 25 msec training sequence using this technique is practical on multipoint leased circuits in both the U.S. and Europe.

Walsh is an executive engineer with General Datacomm Industries, Inc.

Correction

The Yankee Group's regularly updated report entitled "Telecommunications Analysis and Research" is available with four other reports for a total cost of $500. In a recent article, $500 was incorrectly said to be the cost of that study alone [CW, Aug. 13].

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The Hazeltine 1552 Video Display Terminal is an advanced microprocessor design that optimizes interactive real-time operetions with 8 switch-selectable baud rates from 110 to 9600 baud. The basis of the display is the Hazeltine-designed and manufactured TV monitor system. Hazeltine's TV expertise has resulted in a terminal of exceptional quality, performance and reliability.

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Software Lets Terminals Function in SNA Networks

ANN ARBOR, Mich. — Software that enables terminals not supported by IBM's Systems Network Architecture (SNA) to function in SNA networks is available from the DMW Group, Inc.

The System Network Architecture Program (Snap) also reportedly gives terminals attached to IBM Series/1 minicomputers direct access to host resident Information Management System (IMS) and CICS programs.

Using the Series/1 processor as a cluster controller, Snap allows users to attach IBM 4978 and 4979 CRT terminals in an SNA network, a DMW spokesman explained. The package allows those terminals to emulate the IBM 3270 record mode interface.

Two levels of user interface are featured for both interactive and batch operation. The batch mode provides a read/write interface to the SNA network for data transfer to and from the host CPU while the interactive interface supports up to eight 4978s or 4979s.

Under both levels of support the software provides multiple concurrent sessions and each session has its own Synchronous Data Link Control (SDLC) line, the spokesman said.

Snap runs on either the 4953 or 4955 Series/1 processor using the Real-Time Programming System Version 4.0. No modification of IBM support is required, and customers obtaining Snap can also acquire documentation allowing them to interface additional non-IBM terminals to the SNA configuration, the spokesman stated.

The package requires a minimum configuration of 128K bytes of storage on the Series/1, one SDLC adapter per line and the Real-Time Programming System Version 4.0 hardware and software prerequisites.

DMW offers two pricing plans for Snap. Plan A includes a one-time charge of $6,500 for the first Series/1 and $3,450 for each additional processor, and Plan B includes a one-time charge of $2,000 plus a monthly fee of $250 for 24 months for each processor.

The software comes on a double-sided diskette and one year's maintenance is included, the spokesman added. DMW is at 2395 Huron Parkway, Ann Arbor, Mich. 48104.

Datapoint Users Get CRT Station

SAN ANTONIO, Texas — Datapoint Corp. has released a CRT terminal for use with its Datashare Business Time-Sharing System.

The Datapoint 8200 Datastation allows operators to select send and receive transmission rates by entering the appropriate values in response to a menu screen display. These rates may be set independently of each other, a vendor spokesman noted.

The operator can adjust screen brightness through the keyboard to suit room lighting conditions and can, as an option, duplicate selected keys and control cursor movement with the keyboard.

The RS-232 compatible 8200 functions as a local or remote terminal, reportedly allowing data entry, program execution, data communications and a number of commercial applications from a common data base.

Communicating with the Datashare processor at rates up to 9,600 bit/sec, the 8200 supports a variety of optional Datapoint serial printers and can replace the vendor's 3600 Datastation terminal in a Datashare configuration.

The 8200 features a 1,920-char., 80-col by 24-row CRT screen with a screen refresh rate said to be in the "50 or 60 times per second" range.

The Datastation can be purchased for $1,450 or leased for $47/mo on a three-year basis, Datapoint said from 9725 Datapoint Drive, San Antonio, Texas 78284.

Codex to Carry Infoguard Line

MANSFIELD, Mass. — Motorola Inc.'s Infoguard line of data encryption systems will be sold to commercial users by Codex Corp., a wholly owned Motorola subsidiary, from now on.

Motorola's Scottsdale, Ariz.-based Government Electronics Division developed the Infoguard family and began marketing the network security products more than a year ago. Government Electronics will continue to sell the products to the federal government. Federal users — except in highly sensitive military applications — are required to comply with the Commerce Department's Data Encryption Standard (DES). All Infoguard devices are said to meet the DES specifications.

A network security module (NSM) located at each end of the transmission line between the data terminal equipment and the modem performs the enciphering and deciphering functions in any Infoguard configuration.

A key generator module automatically generates encryption keys for all nodes in the network. The module stores the keys in a manner the vendor claims prevents any unauthorized access.

The NSM has an "approximate" purchase price of $3,300 and may be leased for $140/mo. Quantity discounts are available and shipments are slated to begin this fall, Codex stated from 20 Cabot Blvd., Mansfield, Mass. 02048.

New device cuts phone costs by concentrating data for more effective transmission.

The new microprocessor-based Prentice SNP-1000 Statistical Network Processor takes data from as many as eight different sources, buffers it, and transmits it at speeds up to 9600 bps in variable-length blocks according to each individual channel's immediate needs. And it does all this with virtually error-free accuracy.

By combining an intelligent concentrator with a statistical time division multiplexer, the new SNP-1000 transmits more data over fewer circuits.
Traditional frequency and time division multiplexing schemes allot data channels to specific and discrete portions of the transmission circuit. The new Prentice SNP-1000 mixes signals according to their individual and often rapidly changing needs. A slow-speed source gets only a small portion of available transmission time. A busy circuit gains access to larger portions of the data link. Thus idle terminals don't take up transmission capacity better used by active data sources.

This "intelligent" TDM technique lets you transmit your current data volume over slower speed lines. Or lets you increase your data flow over high-speed facilities. Either way it represents a practical way for a network designer to increase data traffic flow, and economize on telephone line expenses.

The SNP-1000 operates in point-to-point or in multi-point networks.
An SNP-1000 8-channel unit can be configured to connect to, and internally poll, up to 8 separate multi-point SNP units. This allows an asynchronous network to use the SNP-1000's synchronous protocol for error correction and polling operation without an expensive polling front end processor or intelligent terminals at remote sites. The SNP-1000 accepts mixed input data speeds within the same system, be it leased line or dial-up.

Available documentation and software lets the computer multiplex and demultiplex data on the high-speed line, reducing the number of computer ports dedicated to the communications system. It also

eliminates the need for an SNP-1000 at the computer end of the line.

Plug it right into your system. It's completely transparent to terminals, CPUs and software.
You can put the SNP-1000 to work without changing a thing in your existing system. Data flowing in and out of the unit is not affected in any way except that it is transmitted with much greater efficiency.

Automatic data checking guarantees virtually error-free transmission.
Using sophisticated error-checking routines, the SNP-1000 continuously monitors data transmissions to ensure that valuable information is not lost because of transmission line irregularities.

Diagnostics give you instant information on your operating parameters.
Front panel, At-A-Glance™ diagnostics come standard with the SNP-1000. These ten indicator lights inform users that a retransmit request (ARQ) is being sent to their remote station, that a local channel loopback is in effect, that an error has been detected in received data, that a data buffer is 80% full, that buffer capacity has been exceeded, that a remote unit is not functioning, and more.

An optional diagnostic and control port, available on 4 or 8 channel units, lets the SNP-1000 user reset the system, display channel input/output data, display channel status, aggregate status, system options, or system statistics (local or remote), alter channel or aggregate options (local or remote), and run diagnostic tests.

The SNP-1000 uses downline loading to alter remote unit operating parameters from a central location. Simply set a few switches, or key entries in through a keyboard with the diagnostic and control port. New parameters are automatically downloaded to remote, unattended locations.

Prentice has a brochure and an application note with more information on features, specifications and network design.
For your free copies, write Prentice, 795 San Antonio Road, Palo Alto, California 94303, or call (415) 494-7225.

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Executives' Dilemma Seen: Coming Recession vs. Need For Communications Today

LONG BEACH, Calif. — Faced with tightened corporate budgets and a mounting need for efficient communications, executives responsible for information networks are confronted with a new dilemma, according to the president of Computer Micrographics, Inc. here.

While sophisticated office technologies and systems continue to proliferate, the coming recession is making companies look more judiciously at ways they can improve their overall data handling function, David S. Shanks has concluded.

"Communicating word processors, intelligent copiers and electronic mail are just a few of the new systems," Shanks noted. "But while many executives realize the need for systems of this sophistication, many are hesitant to expend corporate dollars because of the uncertainty of the economy."

Data managers basically must choose between on-line digital computer systems and microfiche generated from computer output microfilm (COM) as storage media, Shanks observed. But the choice is not an easy one and "significantly affects the path a company follows into the office of the future."

There are advantages and shortcomings to both technologies that must be considered, he pointed out. "People in DP originally looked to COM as a stopgap measure for the information explosion, rather than as an active information handling tool. This attitude has changed since, in reality, COM is both.

"COM-generated microfiche . . . will prosper until on-line data storage and retrieval is made cost-justifiable for a wide range of users," Shanks maintained. "This role, which some considered temporary, has existed and will continue to exist for some time. COM has filled a void as a practical and essential medium for information processing for a wide range of user companies."

The ability to access data, virtually instantaneously, is an important feature of computer storage for many companies, he continued. Another major benefit is the ability to readily change or convert the data stored.

"For many medium-size companies, however, implementing a sophisticated on-line system for data management is not always feasible from this cost standpoint. Micrographics, on the other hand, which by comparison is less expensive to implement, is a viable alternative," Shanks asserted. "But, for certain users, it too may not be appropriate."

New users of advanced systems should carefully judge the effectiveness and practicality of all other office technologies that are designed to improve overall corporate communications, the company president said. "Centralized or decentralized word processing and DP, teleconferencing or videoconferencing, computer-assisted retrieval or manual systems for microfiche and other new technologies all present various approaches to an effective information network.

"Structuring a comprehensive plan for studying these systems and their implications for the company's overall communications network is essential if the full benefits of the equipment are to be realized," Shanks concluded.

Packet-Switching Seminars Set in Chicago, Washington

LOS ANGELES — Two seminars on data communications services and concepts in packet switching will be held in Chicago and Washington, D.C., respectively, by the Technology Transfer Institute.

The Oct. 8-10 "Data Communications Services and Protocols" seminar in Chicago will detail the data communications facilities of the telephone network and other common carriers, data transmission over the telephone network and control structures that manage interconnections in a computer, the sponsors said.

"Computer Communications Protocols," to be held Nov. 9-7 in Washington, is designed so attendees "will gain an understanding of the scope of communications and control protocols for computer networks, the requirements placed on them by transmission media, hostile environments and applications for those who develop or use packet-switched communication systems."

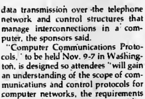
Registration for each seminar is $675. Further information is available from the institute at P.O. Box 49765, Los Angeles, Calif. 90049.

AJ Modem Runs Up to 450 Bit/Sec

SAN JOSE, Calif. — Anderson Jacobson, Inc. (AJ) has introduced a modem that it said transmits and receives full-duplex asynchronous data at speeds up to 450 bit/sec and provides a dual terminal interface for RS-232 or 20mA current-loop terminals.

Compatible with Bell 103-and 113-type modems the AJ 245's transmitter circuit is quartz crystal-controlled for "extreme accuracy over long periods of time," the vendor claimed.

The unit costs $192 in quantities of 50. AJ is located at 521 Charcot Ave., San Jose, Calif. 95131.


HOW WAS DISNEYLAND?

On the Trail Of Effective DP Audits

By J. Burke Hansen

Crime just isn't what it used to be. Computer technology and information on the move have revolutionized the art of stealing and made it more worthwhile. While the traditional armed robbery will net a criminal an average of $10,000, scoring $1 million or more in a computer heist is not extraordinary.

It is no wonder then that security of information from unauthorized disclosure, modification or destruction has been an important part of both DP and auditing ever since the first punched-card system. But the "closed" data card shop was exposed to only a fraction of the security threats of today's large networks of computers and terminals.

By 1980, the volume of data traffic — much of it sensitive or proprietary — will exceed that of voice traffic over common carrier lines. Moreover, because most companies and institutions depend increasingly on computer systems as the single major source of operational information, the security of their information assets has become an ever-increasing concern of management and has led to recent privacy legislation and regulatory standards.

So, we recognize that data security is necessary for organizational safety. We know it is required for compliance with laws and regulations. We are also convinced that the growth of data transmission and information utilization will present ever-increasing threats to security.

We understand the concern of management and the attention of DP professionals and auditors to the need for computer security. What's the problem?

Four-Part Syndrome

The problem lies in a four-part syndrome (shown at right).

First, *management* demonstrates a high degree of concern for achieving organizational goals within a limited budget. This often takes a high priority over the time and expense of acceptable computer security because of a necessity called survival.

Then there are *DP professionals* who face an ever-increasing demand for speed, accuracy and volume of information yet who are constricted by lack of funds, trained personnel, personnel turnover and limited budgets.

Third, the *computer manufacturers and software houses* are vital components of corporate self-preservation.

Finally, we include the *auditors,* whose responsibility historically has been the security and control of information as well as the appraisal of how well organizational policy has been carried out and cost efficiencies observed. In today's organizational environment, however, the audit tracks have turned into bits and bytes, and the processes have moved from ledgers and journals to tapes, disks and mass storage cartridges. And far too often the decisions for major capital investments in computer technology are made between DP people and computer manufacturers, without the direct involvement of internal auditors and management.

Here is the essence of the problem: Auditors must certify the accuracy and safety of information through the computer system as well as the system's cost effectiveness, yet typically they know little or nothing about basic DP technology. They have little time and few resources to keep up with DP's desire to innovate or the computer industry's necessity to sell, given management's unquenchable thirst for more information in an environment of sophisticated competition.

Compounding the syndrome, educational institutions are behind in preparing computer-trained auditors or audit-trained computer technologists. At the precollege level, it makes little difference, really, which approach is taken. But even at the college level, institutions generally do not seem to be making a quick enough response to have a significant impact on the syndrome for years in the future.

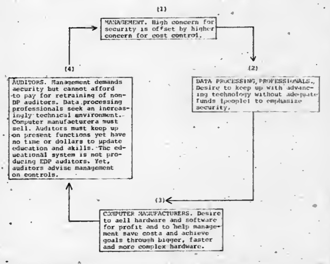
What's Left?

What's left? Either retrain present auditors to understand computer systems and software or train computer specialists to think like auditors. While the debate over that choice goes on, the problem of the lack of computer security compounds itself exponentially.

Besides, who has time? Management cannot afford to let its auditors go for long, so while we need the computer security, we

(Continued on In Depth/2)

Management-DP-Audit Syndrome



MANAGEMENT. High concern for security is offset by higher concern for cost control.

DATA PROCESSING PROFESSIONALS. Desire to keep up with advancing technology without adequate funds (people) to emphasize security.

COMPUTER MANUFACTURERS. Desire to sell hardware and software for profit and to help management save costs and achieve goals through bigger, faster and more complex hardware.

AUDITORS. Management demands security but cannot afford to pay for retraining of non-DP auditors. Data processing professionals seek an increasingly technical environment. Computer manufacturers must sell. Auditors must keep up on present functions yet have no time or dollars to update education and skills. The educational system is not producing EDP auditors. Yet, auditors advise management on controls.

(Continued from In Depth/1)

can't spend the training time to get it. As a result, too often we audit *around* the computer, hoping to avoid the threat of white-collar crime and enduring the self-perpetuating inefficiencies of the syndrome.

Hard Role to Fill

The role of a competent DP auditor is an exceptionally hard one to fill. A combination of years of experience, education and training in the highly skilled professions of auditing and DP is required. People with these skills do exist, but the demand far exceeds the supply.

The DP audit function has grown significantly only in the past few years. The 1977 Systems Auditability and Control (Sac) report from SRI Internatiooal stated that of 172 survey respondents, .7% had a DP audit function before 1950. A full 70% of the existing DP audit functions have been established since 1970, according to the report, and 28% of that activity occurred during 1975. Today, a review of the position announcements in DP publications, trade journals and newspapers confirms that demand for DP-trained auditors is at an all-time high.

Many organizations, confronted with requirements for computer-based audits, assign the responsibility to individuals who lack the necessary skills (for a number of reasons). In many cases, their work sets the stage fot even greater exposure to security threats.

They attempt to do the best job they can, given their background and experience. They audit up to the computer, go around the automated system and audit the outputs and applications.

The problem with this approach is that, once audited, management and the DP staff tend to develop a false sense of security or blind trust regarding their systems. Such a feeling opens the doors even wider for white-collar criminals to rob the organization of its most valuable assets — information, cash and inventory. Worse, this approach to audit control usually leads to the organizational syndrome described earlier. DP blind trust may be management's greatest weakness in the '80s.

Cost-Effective Solution

Is there a cost-effective way to train both DP auditors and DP personnel without interrupting their service to an organization?

Is there a training approach that will take advantage of the auditor's experience and the computer specialist's technical skill to change their organizational roles from reactive examiner to proactive designer?

The state of Illinois believes it has made a breakthrough in this area. Through the coordination of the Bureau of Audits and under the direction of J. Burke Hansen and Associates, a program was designed to train internal auditors for DP auditing on a cost-effective basis. It just may prove an alternative to the management-DP-audit syndrome.

The training program has two basic applications. For a large organization, it can render a comprehensive and cost-effective way to train many "in-service" internal auditors without losing their services for extended periods of time. For smaller organizations, who may have a need for training one or two internal auditors, public sessions are available (in larger cities) where the auditors are brought together and the cost of training is considerably less.

Regardless of which approach is used, the cost of highly needed training is reduced by a format that allows for training, study and work at the same time.

The state has a highly sophisticated, centralized DP system. Through the Office of Management Information and Communication (Omic), a vast majority of the state's data is processed (by remote job entry, batch and real time) in a "utility-type" centralized DP center.

State Facilities

As of this writing, Omic has two IBM 370/168MPs, one IBM 3033 and one IBM 370/158MP. The peripherals supporting these mainframes include an IBM 3850 mass storage unit, 228 disk drives and 56 tape drives plus a sophisticated telecommunications network and diagnostic capability. The system supports 28 state agencies and

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Jerry Bramlett, Data Processing Manager
City of Huntington Beach, CA

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Kenneth R. Pickel, Assistant Director of Data Processing—The Cleveland Clinic Foundation, Cleveland, OH

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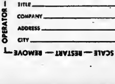
John A. Murray, Data Processing Officer
Putnam Trust Co., Greenwich, CT



"We use SRI/EDIT to enhance SRI/EDIT." says Charles Warzecha, SRI Marketing Representative, who helped develop this software product. "We realized the need for on-line programming in our own Data Center early in 1974. We have been sharing our efforts with fellow Burroughs users since 1976, and we improve SRI/EDIT constantly to fit their requirements. Now our fifth major release, SRI/EDIT 5.0, adds features like a time/event scheduler, security by user, and the ability to view data files. When our users want more capabilities, they ask us. We're determined to keep SRI/EDIT the finest Medium-System text editor available."

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serves some 600 dedicated lines with approximately 5,000 terminals.

Omic operates and maintains the equipment and provides software services to state agencies, local governments, elected state officials, educational institutions and other state governmental units. To provide this range of service, Omic has one of the largest DP facilities in the U.S.

The internal audit function of the Illinois state government operates in a decentralized mode. Each year the government designates those agencies that should have a full-time internal audit function.

Presently, 44 agencies with appropriations of $6 million or 560 employees are required to have a full-time internal audit function. Thirty-five other smaller agencies receive internal auditing services from the Bureau of Audits, Department of Administrative Services. The bureau also evaluates all audit work plans and reports and conducts training sessions for all internal auditors.

Need Identified

With the help of outside compliance audit reports, the Bureau of Audits identified a need for additional technical DP knowledge to assure quality audits in all agencies.

A telephone survey of 16 state agencies in December 1976 revealed that only six were then conducting DP audits. The level of sophistication of these audits varied; however, none could be classified as advanced — that is, auditing "through" the computer.

With a need for training identified, the Bureau of Audits, through the efforts of Audit Manager Robert Swarz, tried to locate resources within the state government.

The Management Information Division's (MID) Training Center developed two courses (three days and a one-day follow-up), but an auditors' evaluation found they required a far too sophisticated level of DP knowledge.

The Bureau of Audits and the MID Training Center then developed a curriculum of courses to provide the level of DP sophistication required to conduct audits, but the cost of $1,075 per student and a commitment of 54 training days were considered excessive.

The bureau then established a DP Audit Training Committee to find ways to provide an equivalent level of sophisticated DP training at a reduced cost and in less time.

One approach identified available training outside state government. Of the many companies and individuals contacted, Harold Weiss of the Automation Training Center in Reston, Va., offered probably the most comprehensive courses. Three one-week courses would take an auditor with no DP experience through programming to systems development to sophisticated auditing techniques. Unfortunately, his scheduled courses were booked for more than two years. The prices of other courses (approximately $600 per person for a three-day seminar in Florida or a four-day session in Chicago) made the approach of going outside state government unfeasible.

The last approach was to develop an in-house training course. The DP Audit Training Committee refined the curriculum requirements and gave them to a training consultant group under contract to the MID Training Genter.

A proposal was submitted to develop the training program, prepare study materials and conduct four three-day training sessions. The proposal was split into a development and a training phase. A contract for the development phase was awarded to the consultant group in June 1977.

Conference Enlightening

At the same time, two Bureau of Audit staff members attended a DP auditors' conference in Houston. They concluded that most DP auditors came from DP shops and that Illinois was several years behind the industry in DP auditing.

A high point of the conference was the presentation by Donn Parker of SRI International, who made several predictions for the 1980s:

- Most DP audit crimes now committed are on the periphery of the computer — either before or after information is processed. However, computer crime will become more sophisticated through complicated programming.

(Continued on In Depth/6)

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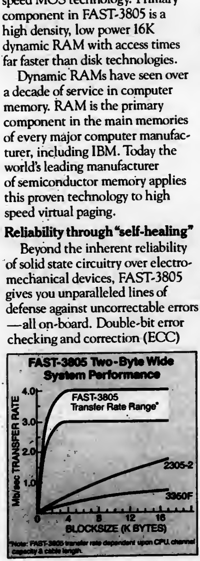

FAST-3805 Two-Byte Wide System Performance

*Note: FAST-3805 transfer rate dependent upon CPU, channel capacity & cable length.

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Avg. Latency (msec)	0.4	8.4	5.0
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(Continued from In Depth/3)

- Automated crime will decrease in the 1980s because of the great effort involved, but when it does occur, it will involve much larger sums of money. He said, "Instead of taking a couple of thousand, why not let it run a few more seconds and get a couple of million?" He speculated that anyone going to the trouble to make elaborate plans will want to make it worth his while.
- The term "DP auditor" will revert back to "auditor" since what is now a specialization will become essential job knowledge.

In light of this input, our development efforts were reviewed and approved by the DP Audit Training Committee. A contract was issued in September 1977 for the first DP audit training course. The fourth and final session was completed during February 1978.

The announcement of the first training course included a request for the students to complete a background survey. We wanted to learn if any factor such as sex, work experience or age improved the opportunity to benefit from the training.

The data from the 22 men and three women in our first course revealed:

- Four years' average auditing experience, with a range from one year to 14 years.
- 1.8 college semester courses in DP for the 77% of the students with college training.
- Sixty-three percent of the students had had six work days of company-provided training in DP.
- Seventeen percent of the students had had no prior DP training.
- Thirteen auditors were less than 30 years old; 11 were over 30.
- Thirty-three percent of the students had had prior DP work-related experience.

We learned that none of these factors was predominate in the five students who appear to have benefited most from the first training cycle. (Degree of success in conducting a DP audit was the measure used to decide, subjectively, who the top five students were.)

The Bureau of Audits began a recruitment effort for the second DP auditors' training course, to be conducted from September through December 1978. This session was to be open to state employees who, while not internal auditors, would benefit from the knowledge of DP concepts and auditing techniques. As a result, 50% of the students who enrolled in the second session were not internal auditors. The third training cycle began in April 1979 and ended in July. The fourth cycle is now being formed.

To date, 66 persons from 28 state agencies, including the Office of the Secretary of State, State Treasurer and Auditor General, have completed the training course.

Adult Education Format

The general format of the training program was patterned after an approach to adult education proven successful over the past decade for those who must work full time yet desire an advanced degree.

The audit training program begins with an orientation meeting where new students are briefed about what they should do, how they should do it and what is expected of them. In this session, the instructors are introduced, the text material is discussed and the assignments for the full four-month program are reviewed.

The following overall objectives are discussed:

1) The participating students undergo an extensive introduction to DP concepts and programming tech-

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niques. Upon completion uf the training program, they should be prepared to "open" a Cobol program and audit the data division as well as the procedure division.

2) The participating students are given a background in systems and will be able to evaluate the appropriateness of the entire DP system including the noncomputer aspects of data capture and communications.

3) The participating students undergo an extensive introduction to computer-based auditing technique and should be able to design an effective and efficient audit program for any agency or department that has direct interface with automated DP equipment, both on-line and off-line.

4) The participating students are given an extensive introduction to audit software, its use and misuse. Upon completion of the training program, they should be able to use new methods of detecting computer-based fraud.

5) The training program provides a comprehensive introduction and review of most of the accepted techniques and tools of computer-based auditing. It was not designed to be an "end-all," but rather a starting point to professional computer-based auditing. Specifically, the students who successfully complete the program and express a desire to further their training might be well-informed candidates for further advanced training.

The students are then released for three weeks with the charge of reading and doing home study in preparation for the first three-day seminar. In addition to text material, a relatively large volume of up-to-date photocopied information is handed out

In the first seminar, it is assumed that the students have no background in DP. The fundamentals, nomenclature, basic concepts and role of the auditor in DP design are covered through an interesting, "student-involvement" methodology. In the first three-day session, students:

1) Gain a clearer understanding of the role of DP in contemporary auditing.

2) Learn the basic terminology frequently used io DP systems.

3) Gain an understanding of the four divisions of a Cobol program and how the symbolic representation of programmed commands are mechanically executed by the computer.

4) Gain an appreciation for hardware terminology and the technology. That is, they are taught not only what the equipment can and cannot do, but how the equipment works.

5) Gain an understanding of the functions of programming, what information must precede an effective programming effurt, where that information should originate, how it should be communicated and what the responsibility of management should be in the coordination of the transformation of a manual system to an automated system.

6) Gain an understanding of the hardware and software utilized in telecommunications including terminal technology, multiplexing, multiprocessing, mass storage, operating systems, virtual storage, job control language, optical scanning, systems design and backup control.

7) Learn what is expected of them in relation to the independent study assignments, how the material will aid them in their effort to develup a working knowledge of DP and how the material studied will be used in future classroom activities.

At the conclusion of the first three-day seminar, another text, additional photocopied material and home assignments are given to the students.

Once more, they involve themselves with the task of preparing for a three-day seminar. However, because of the topical areas covered in the second session, this preparation is somewhat different from the first. Problems included in a workbook, companion to the textbook, keep the student challenged and quite busy.

The second seminar is taught differently. It is a "how-tu" workshop. The students are taught the basics of Ansi Cobol (the language most frequently found in their work environment).

They are given classroom exercises and write programs in response to the tasks assigned and the instructions given. If a conceptual continuum is possible, they strive to achieve an "upper beginner" to "lower intermediate"

(Continued on In Depth/8)

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(Continued from In Depth/7)

capability in Cobol programming.

It should be noted, however, that the objective of this session is *not* to make programmers out of auditors, but rather to give auditors the background necessary to communicate with technical personnel. It is felt that no better experience can prepare them for this task than to actually experience the thrill and agony of production programming.

In this second session, the participants:

1) Gain an understanding of the Cobol language skeleton.

2) Are briefed on Cobol coding forms, sections, paragraphs, sentences and file description to gain an in-depth appreciation for the written command of Cobol programs and how they control the machinery discussed in the first three-day seminar.

3) Gain a basic understanding of the arithmetic verbs, the branch and loop instruction, the picture clauses, the nonnumeric literals, the accept verb and value clause.

4) Learn to write "upper beginner" to "lower intermediate" Cobol programs.

5) Learn what would have to be present in a program in order for "computer-based fraud" to take place.

6) Learn what is expected of them in relation to the independent assignment, how the material will aid in their effort to understand a program well enough to audit its data and procedure divisions and how the material studied will be used in future classroom activities.

Closer to Work Experience

Following the same format of the first session, the second session is concluded with the assignment, tests and materials needed for the third session. The students once more begin three weeks of preparation for yet another totally different learning experience.

The third session is perhaps the closest to the actual work experience of the participating students. The third three days draw on the expertise of the instructor and focus on actual "computer-based auditing." The experiences range from software usage to actual field interviewing of DP managers. The concepts of "total system audit" and "thorough computer audit" are emphasized.

It is in this session that the tools, terms and concepts of the first two sessions are synthesized and utilized in an effort to attack the "real" problems at hand — system weaknesses.

The third session focuses on:

1) The requirements of computer-based systems design for good internal control.

2) The internal control problems in batch processing and on-line, real-time systems.

3) The methodologies available for obtaining and evaluating audit evidence in computer-based systems.

4) The planning phase of computer-based system audits.

5) The types and standards of audit documentation currently used in the audits of computer-based systems.

6) The principles and uses of test decks and audit software.

7) The public record on computer-based fraud cases. Students are challenged to devise audit tests for detecting these types of irregularities.

8) The potential benefits from increased operational knowledge of computer-based system auditing.

Here again, the assignments for the last session are given at the end of the seminar. However, instead of covering "new" matter, the students are encouraged to review what they have studied so that they might apply it to the problems of the final workshop.

Final Session

In the final session, little, if any, new material is introduced via lecture. Rather, each team of auditors (four or

(Continued on In Depth/10)

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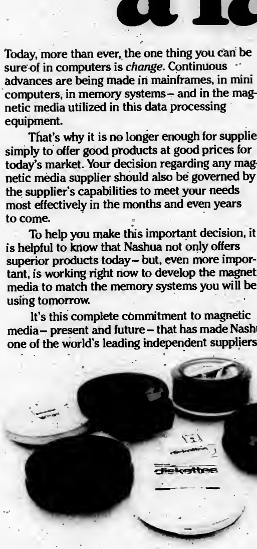

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(Continued from In Depth/8)

five on a team) is asked to bring one technician (programmer or systems software specialist) so that each team has at least one additional member.

These teams are given hard copies of programs and assigned the task of auditing the data and procedure divisions. The technicians are encouraged to act as advisors to their teams relative to programming procedure and/or technique.

The auditors are encouraged to act as advisors to the team relative to audit technique, information storage and retrieval weaknesses and standard accepted accounting procedure. The purpose of this exercise is to establish team cooperation and effective communication.

This process is repeated three times, with each program getting progressively more complex. In some instances, only perceptual weaknesses are incorporated into the programs; in others, trickery or system fraud is used.

Generally speaking, the auditors are taught to look for structured vs. unstructured programming and the adequacy of visual documentation such as flowcharts and system narratives. The approach is to scan the paragraphs, making sure all sequence numbers end in zeros (if a resequence sub-subsystem has not been used in an attempt to identify program modification). A great deal of attention is afforded "programmer style" — for example, indentation — in the search for fast modification of program procedures as a key to program modification.

The auditors also focus on the use of "bad names" — those that are brief and easy-to use, but are in no way mnemonic (memory-assisting). Fast and easy names, with weak or lost documenation, and unstructured formats equal a "street car named disaster." Yet, they are very prevalent in day-to-day operations and make a system very vulnerable to the white-collar criminal.

Operationally, the auditors are instructed to obtain "spot check" program documentation, ask for an "auto-dump" and compare number lines. If the line count is different, they are given a series of questions to establish documentation for program changes. This often leads to systematic weaknesses in program alteration procedures and authorization frailties. Also, they are taught audit-software application techniques designed to evaluate the control consistency between stored program documentation and user output.

These are but a few of the general tactics explored in the final "application" workshop.

Of major importance, it is emphasized on the last day that if verification is not possible, if cooperation is not forthcoming or if the "sense" of initial weakness or misdoing is detected, the auditor should seek help. What is being done, and why, must make sense in or out of a DP system.

Terminal Instruction

Finally, computer terminals are set up and the teams are instructed in how to call a program from storage, display it, change it and wipe it out. Hands-on experience gives the auditors a real-life awakening as to the vulnerability of information in their sophisticated environment.

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1) Reviews computer concepts, terminology and technology essential to communicating effectively with computer technicians.

2) Reviews the techniques and terminology associated with Cobol programming.

3) Gains a clear understanding of computer-based auditing on an on-line, real-time system.

4) Reviews audit planning, test decks and audit software packages.

5) Studies a series of computer-based fraud cases in order to establish an understanding of the types and patterns of computer crime.

6) Puts into use the concepts and techniques described in the training program. A full day of case study, from elementary to advanced, forces the students to interact and begin application.

Program's Success

The ultimate success of any training program rests in what the trainees think of it, what they do with the information they've learned in class and what efforts they will make to enhance this newly acquired material.

To gauge the effectiveness of the training program, two evaluation questionnaires were used. One was distributed on the last day of the final session, and the other was sent out a year later. As might be expected, the first questionnaire dealt mainly with the students' initial reactions to the training sessions. Eighty-four percent of the students indicated they were satisfied with both the level and quality of instruction and they had achieved their personal objectives through the course. Eighty-nine percent of the trainees said they would recommend the course to their colleagues. The overall quality of instruction throughout the four sessions was consistently rated excellent, which undoubtedly contributed to the success of this training approach.

The second questionnaire was distributed by the Illinois State Bureau of Audits a year after the first training course was completed. It focused on the subsequent experiences of the participants and asked the students to reflect upon their audit experiences during the last 12 months as relevant or not relevant to what they had learned in the training course.

Eighty percent of the respondents said they had used much of the class material in their work assignments during the past year and that, based on the conduct and outcome of those work assignments, they would still rate the training program very good in instructional quality and informational content.

The students, in fact, have put their training to good use and have conducted DP audits in several state agencies. The scope of the audits ranged from fairly routine shop reviews to complex, multifaceted audits of some of the largest, most sophisticated agency applications in the state. The end result of all these audits has been, by and large, successful.

Further, Illinois has tightened security measures in DP installations, while the trained auditors have offered input into the system's development and design phases of proposed automated systems and made data input and output procedures more efficient. In addition, the Bureau of Audits has been given the go-ahead to perform comprehensive reviews of the state's central computer network facilities.

Finally, the training course is judged by the Bureau of Audits to be successful because of its repeat ration and because of the desire for additional advanced DP audit training that has been expressed throughout the state.

The 12-day/four-month training course has been offered three times since its debut. As of this writing, 66 students have graduated from the classes. As a direct result of the training efforts and under the direction of

(Continued on In Depth/12)

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(Continued from In Depth/11)

Swarz, the graduates of the three classes hold quarterly meetings where they share information and experience gained in conducting DP audits as well as exploring avenues of professional advancement. Several of the graduates belong to the National EDP Auditors Association and the local chapter of the Institute of Internal Auditors.

Advanced Course Planned

Recently, efforts to develop a second, more advanced training course in DP auditing have begun. This type of instruction will be directed toward the internal auditor whose work group operates in a highly technical, automated environment. The sessions will be oriented toward auditing data base management systems and telecommunications networks and will build on the conceptual and experiential backgrounds of the graduates of the first efforts.

A program designed to train auditors to become "computer-based auditors" can only succeed if its initial objectives are achievable and its approach is realistic. One cannot expect a nontechnical auditor to assume over night an information base capable of challenging the criminal minds of highly trained technicians. Nor is it realistic to expect a highly trained technician to master the sophistication of true audit technique in a short time.

Yet, time is the issue. At best, we have learned that perhaps the most challenging of all roles to be played in this stage of organizational change is that of the manager. What is needed is a concentrated communication effort to bring together the somewhat different talents of the internal auditors and the DP expert.

It is management's job to encourage and support training efforts to make auditors more aware of the problems and constraints of the systems staff and, perhaps more important, to afford an opportunity for the technical people to learn, experiment with and adapt to the organizational insight, constraints and methodologies of experienced internal auditors.

James Hansen is president of J. Burke Hansen and Associates, a consulting firm in Edwardsville, Ill., and assistant professor of management at Southern Illinois University at Edwardsville.

Hansen teaches a wide variety of DP and general business courses at the university's school of business. His consulting practice specializes in government and business projects.

Prior to forming his own company in 1974, Hansen was director of the Control Data Institute in St. Louis.

Hansen has B.S. and M.B.A. degrees from Southern Illinois University and a Ph.D. from St. Louis University.

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Relational Data Bases: What? When? Where? Why?

For the confused or uninitiated, the author and Computerworld *columnist tries once more to solve the riddle of relational data bases.*

By Stephen L. Robinson

About a year ago, when I began my triweekly column in *Computerworld* called "Data Base Corner," I tried to respond to reader requests about relational data base concepts.

Some readers I just couldn't satisfy. "I didn't understand relational data bases before [reading your column], and I still don't," one irate DPer wrote.

At several recent conferences, people have approached me for my views on relational data bases and to inquire whether they have changed in the last year.

Here is my response to both audiences. Included are my last gasp nontechnical answers to the following questions:

- What is a relational data base?
- Why do we need such a concept?
- What is normalization?
- Where can I buy one?

Logical Description

A relational data base can be most easily through of as a set of rules, procedures and terms for *logically* describing the data which is gathered, maintained and utilized by an organization. Think of it as a logical modeling tool.

Suppose someone asked you to list the data elements gathered by your company that relate to employees. Without a formal logical model, you would probably structure your answer along the lines of applications. You might start with the personnel system and itemize all of the data elements there, such as name, address, Social Security number (SSN) and more. Next, you might proceed to the payroll system, where your itemization would probably be better than 50% redundant with your personnel system list. On to the retirement system, the benefits system, the company-sponsored bowling league, the work schedules, department expenses and so forth, all of which have data about employees.

You would have to go through each of these systems because you have never performed such an analysis before. Having done it once, however, you could reflect your findings in a formal way by a diagram. A relational data base is such a diagram. *It provides a model of an organization's data that is independent of application.*

A relational data base is *not* a data base package (that is, a software package). And relational data base structures are *not* files, records and fields. Indeed, the innovator of the relational data base concept, E.F. Codd, and subsequent contributors to the field have been careful to employ non-DP terminology in describing their structures.

New Vocabulary

To understand relational data base diagrams, structures and procedures, we must first learn some new vocabulary. We will do this by employing familiar DP analogs.

Don't ignore the new terminology! To do so invariably leads to a blurring of the important distinction between *logical* and *physical* data base and a consequent lack of understanding of exactly what a relational data base really is.

Here are some analogs for standard relational terms:

Relational	**DP**
Relation (table)	File
Tuple (row)	Record
Attribute (column, domain)	Field
Key	Key

Figure 1 shows a relation and identifies the terms cited above. The entire table is called the "order relation." Each row, or tuple, contains the identical set of columns, or attributes. In our example, we have explicitly identified four attributes (although the dots indicate more do exist).

Not immediately apparent from Figure 1, but a part of relational data base structures, are the following:

- Every tuple (row) must be uniquely identifiable by a key, which may be a single attribute, or a concatenation of attributes. In our example, order number uniquely identifies every tuple.
- The ordering of tuples within a relation may be arbitrary (as in our example) or sequential, based on any combination of attribute values.

So far we have described only some of the concepts associated with relational data bases — namely, those concerned with the structuring of relations. If we may return again to the physical analogy, we have described the terms which have to do with the data definition language (DDL) of a data base package.

The next step, clearly, would be to describe the analog to the data manipulation language (DML). Since relations are tables, we can envision several simple operators which would facilitate any conceivable manipulation of the entries in a relation. The primary relational operators are:

Select: Which allows the "selection" of one or more tuples from a relation. Example: Select, from the order relation (Figure 1) order 472538. Note: The "result" of a select is a set (perhaps one) of tuples, each of which has the same attributes of the relation from which it has been selected. That is, the result is also a relation which can then be operated upon by the relational operators.

Project: Which allows the "extraction" of one or more attributes from a relation. Example (again from Figure 1): Project order number and data from (over) the order relation.

Note: Just by using the preceding two operators, we can "identify any single entry, or set of entries, in a single relation. For example, to identify the sin-

(Continued on In Depth/14)

ORDER RELATION

Order Number	Customer Number	Date	....	Dollar Value
472538	812	791106		$4,750.00
253067	402	790602		3,825.00
621738	511	791218		6,780.00
. .	.	. .		. .
. .	.	. .		. .

Figure I

IN DEPTH

AN UNNORMALIZED RELATION

Product Number (PN)	Product Description (PD)	Inventory Quantity (IQ)	Order Number (ON)	Customer Number (CN)	Customer Code (CC)	Quantity Ordered (Q)	Order Date (DT)
4023	Widget	1273	A325 A727 A916	412 931 682	A7 A8 C6	28 110 52	18/3/79 20/3/79 20/3/79
7216	Frammus	2126	A325 A612	412 302	A7 B1	400 103	18/3/79 27/3/79

Figure 2

A FIRST NORMAL FORM RELATION

PN	PD	IQ
4023	Widget	1273
7216	Frammus	2126

PN	ON	CN	CC	Q	DT
4023	A325	412	A7	28	18/3/79
4023	A727	931	A8	110	20/3/79
4023	A916	682	C6	52	20/3/79
2126	A325	412	A7	400	18/3/79
2126	A612	302	B1	103	27/3/79

Figure 3

PN	PD	IQ
4023	Widget	1273
7216	Frammus	2126

PN	ON	Q
4023	A325	28
4023	A727	110
4023	A916	52
2126	A325	400
2126	A612	103

ON	CN	CC	DT
A325	412	A7	18/3/79
A612	302	B1	27/3/79
A727	931	A8	20/3/79
A916	682	C6	20/3/79

Figure 4

PN	PD	IQ
4023	Widget	1273
7216	Frammus	2126

PN	ON	Q
4023	A325	28
4023	A727	110
4023	A916	52
2126	A325	400
2126	A612	103

ON	CN	DT
A325	412	18/3/79
A612	302	27/3/79
A727	931	20/3/79
A916	682	20/3/79

CN	CC
412	A7
302	B1
931	A8
682	C6

Figure 5

(Continued from In Depth/13)

gle entry 812 in Figure 1, we could select on order number 472538, which would produce an intermediate relation with one tuple; and then Project on the intermediate relation on the customer number.

Join: Which allows the "joining" of two separate relations. For example, suppose we had a customer relation with two attributes, customer number and customer name. We could "join" this relation to the one in Figure 1 based on similar customer numbers. The result would be another relation, which would have the attributes of both "input relations," but without the redundancy of the joining attributes. (Yes, this need not be a one-to-one joining. More about this later.)

Why Do We Need It?

About this time, you may be saying to yourself, "So what! His explanation and presentation may not be as technical as the articles or relational stuff in the *ACM Communications,* and at least now I can drop some new terms at cocktail parties. But does this stuff have any practical value?'

To answer this question, let us examine the shortcomings of some of our present forms of documentation. Typically, we document our application systems with (among other things) flowcharts and file descriptions.

Flowcharts are usually constucted at a level where they are of little use to business (as opposed to DP) people. Endless successions of process boxes which say SORT or PRINT or EXTRACT, interspersed with some decision diamonds which have "?" in them and two exits labeled Y and N may be useful for a computer programmer/analyst, but they can rarely be interpreted by end users who want to change the "business logic" of a system.

A relatively new discipline, structured systems analysis, is directed toward the creation of logical system charts which address the "what" rather than the "how" of physical system charts.

Similarly, file descriptions, which are of physical data bases, are not all that useful to non-DP personnel — especially when discussions transcend existing application boundaries.

For example, consider a bank with a checking system maintained completely independently from a mortgage system. Physical file descriptions exist for each system. A vice-president wishes to know the average checking balance of individuals who have missed payments on their mortgage in the last year.

Looking at the physical file descriptions, it would appear that we could "match" records on some combination of name and address. (Assume, as is often the case, that SSN does not exist for all the checking accounts.)

However, not only are the checking account names and addresses physically different from those of the mortgage system, they are logically different as well. They had different points of entry, different maintenance histories and so forth.

If, by contrast, we had constructed a logical model of our data, showing the relationships between people and accounts, and if we had used this logical data model as a basis for our physical model (not that the physical model would have to correspond one-to-one with the logical model, just so we understood the correspondence), we could now describe the procedures, both logically and physically, to acquire the requisite information.

All of the above is just a brief argument for the value of logical data bases and logical system flows. These two disciplines are extremely valuable to any organization which is contemplating a transition to a data base system philosophy of organizing data.

What is Normalization?

Nothing about relational data base scares people more than the process of normalization. At the risk of horrifying the purists, but hopefully to clarify things for the masses, let's describe normalization as nothing more than a set of transformation rules and definitions.

That is, we shall say a relation is "unnormalized" if it meets our definition of an unnormalized relation. An unnormalized relation can be transformed into a first normal form relation by following a specific set of procedures and so forth through to second and third normal forms.

We shall not include extensive discussion of the "whys" for the different forms ur their relative merits except to note some of the advantages of third normal form as a basis for a physical mapping.

An unnormalized relation is one in which there are repeating groups, that is, domains (fields) within a tuple (record) which are themselves a relation. Put another way, there are domains which repeat in a single tuple. An example of an unnormalized relation extracted from an order entry model is shown in Figure 2.

Note that in this unnormalized relation, the last five attributes repeat for every order line. If this logical format were to be implemented "directly" in a physical system, the mere act of changing a quantity for a line item would involve a search thruugh the tuple for the appropriate product number. This is because we do not have a special relation for the repeating group which is an equivalent line item.

Thus we arrive at the first transition rule: *To transform an unnormalized relation into a first normal form, simply remove the repeating groups and form a new relation.*

Following this guideline with our unnormalized relation, we derive the first normal form relation (Figure 3).

Note: In urder to uniquely identify each tuple in our "new" relation, we had to utilize the concatenation of product number (PN) and order number (ON). Since every line item is now uniquely associated with a tuple, we would not experience the same problem of dealing with a quantity change in a line item.

Second Normal Form

Now let's consider a different type of problem. Suppose we noted that the data for an order was misread (for example, A325 actually came in on 28/3/79, not 18/3/79). Logically we would have to implement many changes to "correct" our data model.

The problem here is that the date field is not really dependent on the product number, only the order number. Accordingly, it is time to explore second normal form.

To transform a first normal form relation into a second normal form relation, remove any attributes which are dependent on only some key items and create a new relation.

Following this rule, we derive the relations in Figure 4.

Suppose one customer had placed many orders. There would be one tuple in the third relation for every order placed by the customer. An apparently simple request such as "change the customer code for customer 506 to B9" would necessitate scanning all tuples, which brings us to the rule for transitioning to a third normal form: *To transform a second normal form set relation into a third normal form set of relations, remove any attributes which are not directly dependent on key items and form a new relation.*

Implementing this procedure, we derive the set of third normal form relations (Figure 5).

The experienced DPer may be ready to say "So what!" to this exercise at this point. That's an obviouis-breakdown of order entry data, one maven might say. It results in one master file for products, one for customers, one for orders and one for line items.

Indeed, the beauty of the formalism of third normal form is that it is quite obvious and logical — so logical that end users, business people with no DP background, can relate to this model.

Where Can I Buy One?

So-far we have spoken in glowing terms abuut the relational data base concept. Why, then, haven't relational data base packages taken over the marketplace? To answer this question, we should first explore the definition of the term "relational data base package."

A relational data base package should provide two distinct sets of capabilities: one relating to data structures, the uther to logical operators.

With regard to data structures:

- The package should support the "flat record" structures discussed earlier; that is, fixed record formats with no repeating data fields of any sort.
- The records should be efficiently retrievable by the tuple-key.
- File organization should facilitate the addition and deletion of tuples.

At a minimum, the package should provide for the execution of the relational operators: Select, Project and Join.

Standard DP operators to perform functions such as adding a record, deleting a record, changing a record, reading selected fields and so forth must also be a part of the package.

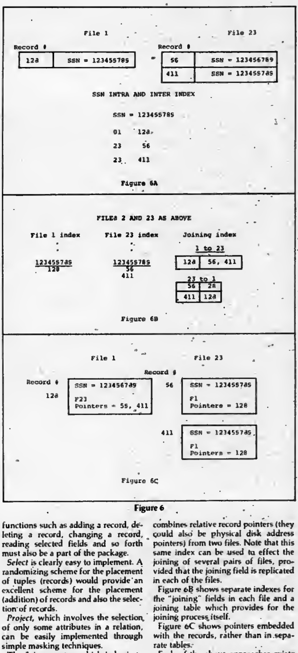

Figure 6A

Figure 6B

Figure 6C

Figure 6

Select is clearly easy to implement. A randomizing scheme for the placement of tuples (records) would provide an excellent scheme for the placement (addition) of records and also the selection of records.

Project, which involves the selection of only some attributes in a relation, can be easily implemented through simple masking techniques.

The *Join* operator, which is basic to most of the standard reports that would emanate from a data base system, is where we encounter a problem.

If we only permitted "joining" on specific, predefined fields, we could easily provide structures to support efficient "joins" Figure 6 shows several alternate approaches to such an implemention.

Figure 6A shows a single index which combines relative record pointers (they could also be physical disk address pointers) from two files. Note that this same index can be used to effect the joining of several pairs of files, provided that the joining field is replicated in each of the files.

Figure 6B shows separate indexes for the "joining" fields in each file and a joining table which provides for the joining process itself.

Figure 6C shows pointers embedded with the records, rather than in separate tables.

Each of the above approaches exists in presently available data base packages. Indeed, this is the basis for occasionally heard claims that a particular package is "relational."

What is missing, of course, is the capability to perform all of these operators "on the fly," that is, without prior knowledge of the requirements for a specific operation. Such a lack of

(Continued on In Depth/16)

(Continued from In Depth/15)

knowledge does not really hinder the implementation of the Select or Project operators.

The most effective way to implement "on-the-fly" joining would be through some form of associative memory. Conventional memories would be acceptable as long as the relations were small enough to be paged through core rapidly.

The interfaces to a relational data base package will initially probably be along conventional DP lines. That is, the DML for compilers will have read commands by fields, instead of explicit Project operators. Selects may be implemented directly (as they are now in many inverted packages), that is, as a selection of records, not as reads. Similarly, join operators will be implemented along existing lines as a selection rather than a read procedure.

Query languages, for non-DP people, will probably continue their trend toward "English-like" (remember when this term was used to describe Cobol?) interfaces with both procedural and nonprocedural options. The advent of relational data base packages should simplify the translation logic somewhat, but will not alter the cosmetics offered the end user.

Summing Up

In summary, the facilities available to the programmer and the end user should not change markedly. It is the business analysts who will benefit from the existence of a relational model of their data and the systems analysts who will benefit from the ease of mapping a relational model into a relational data base package.

Will relational data base packages that appeal to the average to large DP shop be commercially available soon? I think so. Certainly "limited" packages (limited to static rather than dynamic joining) are available now. Full-scale implementations are sure to follow, but I leave it to the hardware seers to guess when associative memory, on a scale large enough to support a large relational data base, will be available.

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Prior to forming his own firm, Robinson was the manager of data base technology for CACI, Inc. and the director of professional development for Performance Development Corp. (PDC).

Robinson began his DP career in 1961 with Service Bureau Corp. In addition to the companies above, he has worked for Applied Data Research, Inc. and Mathematica and has held a teaching fellowship with the Polytechnic Institute of Brooklyn.

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The Promise - and Problems - Of Relational Data Base Design

By Robert B. Chamberlain

Relational data bases. Data base processors [CW, In Depth, June 4]. Data bases on a chip. These are some of the more interesting and most discussed concepts in recent data base thinking.

What has not been discussed, however, is the interplay of these ideas and the concept of the "user requirements analysis" as it is now generally perceived and practiced.

This article will attempt to provide a background by which we can discuss some of the more important connections and then find concepts which a designer can apply to his work now in preparation for a "real-world" adjustment to these valuable but still abstract approaches.

Learning Users' Needs

First, let's look at the matter of user requirements analysis, a common-sense approach which travels under many flags and titles such as data flow analysis, information analysis and user systems analysis.

These approaches all have "rigor" in common: Each is an attempt to comprehend as much as possible about a user's environment prior to data base implementation.

Always in theory, and frequently in practice, these atempts to define a DP environment include a user interview phase. Sometimes painful and usually horrifying to DPers, such contacts represent an attempt to break with current implementations and sort out what the user really wants and needs.

In its more ambitious phases, requirements analysis can probe such areas as the current and future treatment of nonmechanized data and which future user requirements can be hardened into the data base design.

Sometimes snubbed by hard-nosed day-by-day "trenchers" as impractical, requirements studies are motivated by that most practical of motives — performance — and more specifically, data base performance as measured by the rapidity of data retrieval and maintenance.

> *"Relational files receive two responses. Users and programmers say, 'Look at that accessibility!' Technicians say, 'Look at that overhead!' This contradiction reflects the underlying tensions in relational data base implementations."*

Data base performance is now made or broken by file structure. Requirements analysis is an effort to meet the issue by codifying current and projected realtionships between data elements as established by frequency and nature of usage.

Detail is also provided on which relationships are activated more frequently (transaction volume, to put it in business terms) so that performance trade-offs can then be determined.

The word that best states what the designer is attempting is "anticipation." If he knows what the relationships are now, he can design for what he anticipates they will be in the future.

However, let's assume the question: "Should we be able to have direct application representation of relationships between data elements regardless of whether they have known and/or frequent application usage?" More precisely, this means whether or not known at a *particular* point in the design process.

If your response is "Yes," you have become a possible appreciator of relational data bases.

Relational Files

Stepping back for a minute, we said anticipation was the key behind requirements analysis anticipation with the goal of refining structure and thereby optimizing performance.

The relational design point of view, on the other hand, takes the concept of anticipation and rarefies it. Rather then designing from participative position (drawing in the infield, in a baseball sense), the relational designer becomes "inclusive" in his structures.

In line with that, what is naturally of significant interest to potential users is what relational data base files tables will really look like to them. If these structures (the relational product) have utility, the user and those who assist him will quickly find more or less formal and apropriate ways to get to that product.

Figure 1 (on In Depth/18) provides an illustration of the generally accepted view of relational data base "files." It lets us observe several of the theory's better known characteristics. These include:

1. Uniqueness of primary keys (S.S.No., P.No. and the concatenated S.S.No.; P.No. in the linking file "UTILIZATION").

2. Omission of "OCCURS"-type data; in "PROJECT," for example, the occurence of another "071-56" but in "RESEARCH" would generate a different relationship — that of projects within departments.

3. Each element ("domain" in relational terms, must be updatable independently of every other element other than a primary key on which the element is functionally dependent; for example, in "EMPLOYEES," a secondary relationship between "PLANT" and "GRADE" is unacceptable.

The chart illustrates what may be seen as two files of characteristics (EMPLOYEE and PROJECT) and one of linkages (UTILIZATION). Interestingly enough, their technical composition is equally acceptable in relational theory and our distinction is based on function. (UTILIZATION is yet another way to handle the old many-to-many problem: many people are on more than one project and many projects involve more than one person.)

Underlying Tension

As a tool, relational files generally receive two responses. Users and programmers view the possiblities and say, "Look at that accessibility!" At the same time, technicians mutter under their breath, "Look at that overhead!".

This conflict reflects the underlying tension in relational implementations. While relational files are generally thought of as logical, there is no specific requirement that they can't be represented physically in the same form. Indeed, that would make implementation much more straightforward.

However, the problem of the "join" (creation of a linkage) then appears. This is a process by which subsets or entire files ("tables" in relational terms) are joined as a result of a user query.

Sophisticated software and ideology aside, this linkage can result in what is merely the old inefficiency of going from file to file to maintain and retrieve data — regardless of whether the accesses are performed prior to or while delivering data to the user. The physical/logical situation is therefore significantly more then just theoretical.

(The foregoing remarks and others in the same view assume, of course, a conventional access technology based on the use of indexes, pointers, randomizing, algorithms and so forth. Computing systems using associative store or other technology not widely available now may render this point moot. Indeed, one would hope so. However, the viewpoint here is that of today's data base designer and what

(Continued on In Depth/18)

IN DEPTH

CASES OF PARTIAL RELATIONAL DATA BASE FILES/TABLES

EMPLOYEES

S.S. No.	NAME	GRAOE	PLANT
214-32-6162	Thomas	22	New York
316-35-9527	Kelly	14	Philadelphia
420-18-1664	Carlson	28	Philadelphia
515-27-3522	Davis	26	New York
617-25-9023	Berry	30	Los Angeles

PROJECTS

P.No.	MANAGER	$VALUE	OEPARTMENT
020-85	Smith	020	Research
071-56	Higgins	115	Development
128-12	Cox	200	Marketing
285-19	Paul	045	Research
400-02	Conrad	009	Oevelopment

UTILIZATION

S.S. No.	P.No.	Commit.
214-32-6162	020-85	60%
214-37-6162	285-19	40%
316-35-9527	128-12	100%
420-18-1664	071-56	75%
420-18-1664	400-02	25%
617-25-9023	020-85	40%
617-25-9023	128-12	10%
617-25-9023	285-19	20%

Figure 1

(Continued from In Depth/17)

present developments mean to him.)

If there is no distinction between physical and logical schemas, performance problems ensue because of valid user requests which do not map conveniently to the relational characteristics previously mentioned.

If, however, well-known and valid relationships requiring joins do occur regularly and indications are such that they should be handled in batch sequential processing, the tendency to design and map data physically to accommodate them becomes very strong. The concept of anticipation has thus reentered the picture.

For those situations that require joins, an odd sort of distancing of the application from relational theory has occurred — a logical request for a physical realization of a join (by pointers, actual construction of more tables or whatever) which is itself derived through the physical infrastructure representing a logical normalization.

Even more distancing occurs when a "relational look" is placed on an existing data base management system (DBMS). This approach, reported to be in the planning stage by at least one major vendor, merely places another level of software — which could be quite large — in front of an existing product.

It may look relational to the user, but unless it is appropriate for effective data access, this approach probably will merely serve to become part of the problem. A simulated relational is not sufficient — nor is it likely to survive in the marketplace — as more than a mere transition device.

Clearly, then, significant problems still face formal relational data base systems:

- Lots of space is devoted to complex mapping and retention of access paths.
- Complexity of managing mapping and linkage causes slow response.
- Intricacy frequently causes many I/Os, thereby clogging I/O channels and buffers.

How quickly these problems will be resolved and in what manner are matters of hot dispute. A recent article [CW, March 12] quoted a consultant who predicted an IBM move from IVS to a relational data base system.

A letter to the editor quickly defended IMS as being widely installed and likely to be much less complex than relational systems. All this probably means simply that we have again to find the "universal solvent" (and that there are varied opinions instead of agreement on the simple advancement of truth). However, we can all take heart in the 20th-century alternative — more and better electronics.

Developing Technologies

As the "super-chip" comes closer and closer to reality, it would seem that all the sorrows mentioned previously will be drowned in speed or "bubbled" away — and at what will probably be a bargain rate, inflation aside.

We hear more and more talk of "data base machines" or hard-wired data bases. Even some of today's data base management systems DBMS are being considered for partial firmware implementation on one or more pieces of hardware.

A large semiconductor firm recently acquired one of the significant DBMS packages. While I wouldn't anticipate its marketing strategy, it isn't unfair to assume that its future products and those of other vendors will contain a wedding of technologies.

Furthermore, another variety of data base machine or data base computer is afield. This is the so-called "back-end processor" — a processor devoted to data activity but in itself a peripheral to a host computer.

The processor is usually a minicom-

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puter, its relationship to a front-end processor is that of a medium by which work in a particular area can be performed while the host happily chugs away performing other activities. (The term "off-loading" is sometimes applied to this activity.)

Interestingly enough, this also facilitates data base performance measurement as the many vagaries of the "mix" are replaced by the direct relationship between processors.

The back-end processor, as I'm using the term here, will probably go off the stage as technically extinct to the extent that it uses conventional technology.

However, it will have served a very useful purpose during its stay. It will have illustrated that data base is not a unique problem architecturally. It will also have shown that not only can we think of distributed data bases, we can think of distributing data base management processing apart from either a host and/or other peripheral processors.

Changing Times

The back-end's main impact on the typical data base designer (or administrator) should be to broaden his view of processing opportunities and varieties. If he's thinking "distributed" as an option, well and good — it certainly is part of the mainstream. If he's not evaluating it one way or the other, the back-end processor serves as one more indication of how data base times are changing.

And how they are changing! Also lurking out there is the "array processor," the latest number cruncher. Associative store written large, it may someday leave its current academic and scientific environment and become of interest to large commercial data base users.

With all this hapening, only the most cautious person wouldn't predict a technological solution to relational's problems. In fact, several solutions would be even better; perhaps one in which only "third-normal form" (The relational term for the characteristics mentioned earlier) would be acceptable, another in which both partially and totally normalized data could be managed and even a third in which one manager would handle data sets totally outside a relational structure as well.

'Pure' Problems

We mentioned earlier that, at this writing, prototype relational systems seem to have some problems in their purer form. We also said that the consideration of performance was an important factor in a vigorous requirements analysis.

If performance within a reasonable physical configuration is still a problem, doesn't it follow that relational data base ideas are currently without merit, even if they have interesting potential for the future?

Hardly. These problems are only indicative of present difficulties in pure implementation. What should not be overlooked is a similarity in tone in the individual files derived, whether through normalization or requirements analysis.

Each scheme will evolve files (relations) of which the records (tuples) will generally contain fewer elements (and fewer bytes) than the typical matrix-ridden product of today.

Each will also evolve files which contain data elements linked by a commonality of logic — one because such an element structure provides a means of optimizing retrieval performance, the other because such elements possess the funtional dependencies required for normalization.

And each will evolve files that will reflect a common approach to structuring files through the requirements analysis activity itself — the activity of gathering "data about data" through an interrogative interaction with users.

New Data Structuring

The real crux of the matter is this: *Relational data base theory provides a new way of structuring data but not a way by which file design can be performed without homework.* This is the same home work which is currently a necessity, even though it is not always done. Those who don't do it in the future will indeed be condemned to relive the past.

In the future design procedure, the product of the user requirements analysis will no longer be strictly used to provide files designed to optimize on

(Continued on In Depth/20)

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Figure 2

(Continued from In Depth/19)

all known possibilities in use (the "anticipation" mentioned above).

Rather, the data obtained about user data element usage (and the relationships between these elements) will be used to help construct a "normalized" viewpoint to meet characteristics such as those previously mentioned.

What does this all mean? First, we will probably, because of the advance of technology, be designing some type(s) of relational data base in the fureseeable future.

Will they perform as well? Probably better. Firmware beats software very consistently.

Will they perform as efficiently? No worse, but we won't notice the difference either way (at least for a while). We have here yet another variation of the uld contrast between higher level languages (generalization) and assembler languages (specialization).

In this case, a data base chip(s) or firmware (however "hard") is more implementable as a generalized product, with or without relational theory, than as a customized package for a particular installation — although even prospect (a second stage, so to speak) is not beyond possibility.

Clouds Ahead?

Are there "clouds on the horizon"? Maybe. Let's look at history, computer and otherwise.

The technological thrust of the last 20 years has revealed some interesting love/hate dynamics between user and machine, not the least of which is that increasing user dissatisfaction with DP departments is matched only by higher levels of demand and expectation. Users may be unhappy with computers, but they keep thinking of more and more things they would like computers to do.

In other words, the advances in recent technology, while frequently accompanied by sound and fury, have also been accompanied by a significant advance in the sheer volume of services and data both requested and received by users. I see no reason to think this situation will change.

In fact, the spate of "office of the future" equipment and small business machines coming on the market, the continuing interest in distributed processing and the forthcoming battle of the giants for control of the skies (communications-wise) all help lead me to predict that tomorrow's baseline user requirements may still only be the proverbial gleam in the eye of today's user.

How does this all relate to data base structure and design? First, in terms of data base machines, relational data bases and so forth, it means that the new "great leap forward" will not be the last great leap.

It is reasonable to assume that user needs will expand to match available

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computing power and the cycle will repeat itself.

Second, in design terms, since we can reasonably expect a continuing increase in user demands, we must start now to attempt to quantify the pieces which will comprise this demand. Projects must be used, if necessary, in order to create the best structure within which these inevitable demands can be absorbed.

A need for a continuity in methodology can then be supported in order to cover either end of a long-term scenario: an approach to meet both the requirements of the present — a good requirements analysis for a current DBMS — and of a future in which users will have begun to tax the capacities of the new technology.

A further benefit in establishing such a methodology is that it addresses the all-too-obvious fact that today's data base experience is tomorrow's data base success.

With a diversity of strategies becoming available to designers in areas such as distributed processing and privacy/-security technology, DP personnel must learn to work with data bases and learn how to design them from the rigid requirements analysis point of view. If they don't, their departments will be thrown into a permanent maintenance and fire-fighting posture. (Figure 2 indicates some of the new vocabulary. *An Introduction to Database Systems* by C.J. Date is mandatory reading for an understanding of relational systems.)

It should also be noted that the role of the data administrator will become even more critical as we move toward relational systems.

Any approach to system design that will attempt to actualize a technological wish list including "implementation transparent to the user" and "strong *ad hoc* query orientation" in conjunction with what is essentially a systemwide understanding of relationships between elements (to obtain the proper "normalization(s)") will and does require a strong central decision-making capacity.

What effect will new data-base-oriented technology have on the Codasyl Data Base Task Group (DBTG) recommendations? It probably will not enhance their chance of widespread acceptance and implementation.

Still not accepted by the largest vendor — and with no tangible indication that they will be — these recommendations for a standardized set of DBMS attributes have always been vulnerable to the latest in vendor ingenuity.

With many new and exciting options for DBMS design in the offing, the chances for standardization continue to be weak — although not necessarily undersirable.

This does mean, however, that data base designers probably need not fear the arbitrary imposition of any particular DBMS on them — at least from sources outside their organization.

When his system goes to a relational approach, the designer of the future (who is also, in most cases, today's designer) will use the current tools of requirements analysis but will put up file designs not based strictly on the subtleties of anticipation.

The result he will seek will be a "stable" design — one receptive to any logical construct the user requires. In other words, this will also involve anticipation, but apart from the concerns of "optimization" or performance refinement (from the technician's viewpoint).

The designer will be able to adopt a more passive posture. In his design all things will be possible — at least until this technological edge runs out.

Robert Chamberlain is national manager of technical support for data base distributed processing in the management consulting services group of Coopers & Lybrand, New York.

Chamberlain has been active in DP for 13 years. He has written previously for Computerworld *and the Auerbach Data Base management series and is presently co-authoring a forthcoming monograph on data base management. He has also spoken on and conducted seminars about key data base issues.*

Chamberlain has two degrees, an A.B. and an M.A., from Michigan State University.

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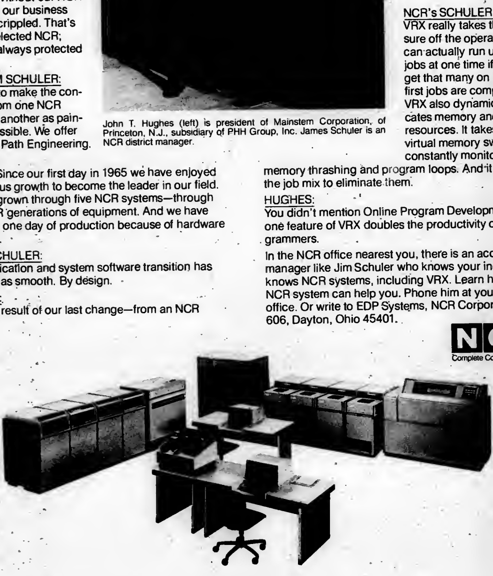


'A Textbook Installation' of an IBM 4331

By Howard A. Karten
CW Staff

NEWBURY PARK, Calif. — Reference Laboratories, headquartered here, recently installed an IBM 4331 to replace its 370/135 in what a company official called "a textbook installation."

But despite the ease of installation and the apparent compatibility between the old and new systems, Jack Murray, manager of field computer systems for Damon, Inc., the laboratory's parent company, still has the 135 standing by.

"It's sitting here, powered down, in position to run if we need it. We're not leaving ourselves naked in the cold," he said.

Installing the 4331 was a nearly effortless project: "The customer engineers started on it at 7 a.m. Sunday, and by 7 a.m. Monday it was up and running." No software modifications were required, Murray noted.

Reference Laboratories, a subsidiary of the $120 million parent, had been using a 512K-byte Model 135 before being tagged for early delivery of the 4331. The early delivery was purely a stroke of good fortune, according to Murray, who was "damned if I know" what accounted for it.

Despite the caution and conservativism often associated with small DP operations, "it doesn't really make me nervous to be such an early user. So far, we haven't had any problems," he said.

The 1M-byte 4331 processes the results of clinical laboratory tests for doctors and hospitals submitting patient samples. The samples — such as blood for hematological tests — are picked up at doctors' offices and hospital labs by couriers and delivered to the firm's laboratories. (There are several labs in different cities, each serving the surrounding area and each with its own computer system.)

At Newbury Park, the samples are as-

(Continued on Page 54)

Goes On-Line With Terminals

School Graduates From Card-Based CPU

ROCHESTER, Mich. — When Oakland University here decided to replace its Burroughs Corp. B5500 mainframe, "it wasn't a tough act to follow," Bill Thompson, director of computer services, said.

The 15-year-old CPU "was almost given to us" five years ago. While the aging mainframe was fine in its day, it could no longer handle the school's DP needs.

So the school installed a $2 million Honeywell, Inc. Level 68/Distributed Processing System (DPS) 1 and moved from a card-oriented system to a terminal-oriented system. The CPU was installed in January to handle academic requirements. However, with a planned upgrade next year to a Level 68/DPS 2, the school will use it to handle administrative functions as well, eliminating an IBM 360/40.

"I think we made the right decision," Thompson said. "There was no one system that could do everything we wanted."

In the seven months the system has been in operation, Thompson has had few problems. The most serious one came when the school's air conditioner broke down. "Things like that happen, but it wasn't the fault of the computer," he said.

After deciding to buy a system to replace the B5500, the school organized a computer selecting committee to evaluate the mainframe market. Most important, in the committee's opinion, was the academic area. The university wanted a CPU that could concurrently handle multiple terminals with a response time of less than 3 sec, according to Steve Fasbinder, assistant director of com-

(Continued on Page 54)

Distributed Processing Powwow Set

HUNTSVILLE, Ala. — The first International Conference on Distributed Computing Systems will be held at the Von Braun Civic Center here Oct. 1-5. Two days of tutorial meetings and three days of papers, addresses and panels will highlight the meeting.

The sessions, sponsored by the U.S. Army Ballistic Missile Defense Advanced Technology Center in cooperation with the IEEE Computer Society, the Institut de Recherche d'Informatique et d'Automatique and the Information Processing Society of Japan, will be supplemented with tours of some local technology meccas. These include the Alabama Space and Rocket Center, the National Aeronautics and Space Administration's Marshall Space Flight Center and the Ballistic Missile Defense Advanced Research Center.

The tutorials will cover distributed system design, principles of distributed data base design, communications protocols and distributed processor communications architecture.

Student registration costs $15 for the Oct. 1 and Oct. 5 tutorials and $15 for the three-day conference itself. IEEE Computer Society members will be charged $75 for the conference and $70 for each of the two tutorial sessions; nonmembers will have to pay $85 for the conference and $80 for each tutorial day.

U.S. government employees — either on active military duty or civil service appointees — will be charged $30 for the conference and $10 for each tutorial day.

The conference registration fee includes conference attendance, a copy of the proceedings, breaks and luncheons, except for students, who will have to purchase copies of the texts separately.

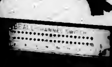
Further information is available from J. Fred O'Brien Jr., the conference registration chairman, at the Engineering Extension Service of Auburn University, Auburn, Ala. 36830.

Howling at the Moon?

Many people believe a full moon has interesting, unusual effects on people and their activities. *Computerworld* is conducting a study to see if this applies to computer room operations.

Has your installation experienced any operating problems or other effects during a full moon? Do you have more — or maybe fewer — problems during this time of month? Do you know of anyone who may have had these problems?

Why not write and share your thoughts and experiences with other readers? Address them to Howard A. Karten at CW, 797 Washington St., Newton, Mass. 02160.



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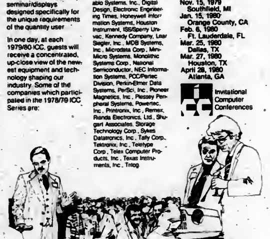

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Tape Subsystem Breaks Data Capture Barrier

Special to CW

MIAMI — In efforts to make its passenger reservations system more reliable, National Airlines here recently installed a magnetic tape system designed to operate at twice the density of conventional tape drives.

Processing more than one million reservations-connected messages daily, the airline often has to deal with up to 40 requests per second from ticket and independent travel agents. It also has to store flight records for two years in compliance with federal law.

"We're in the recordkeeping business, and we've got to be able to handle what's coming in," Woody Hanson, National's senior manager for technical services, noted.

National added 16 Memorex Corp. 3228 tape drives and two Memorex 3222 controllers to its three IBM 370/158 CPUs last October. Since then, the airline's capture time, or time needed to transfer the day's reservations from disk to tape, has been cut from four to two hours.

National plans to cut that time further to 40 minutes by adding a Memorex 3220 tape storage subsystem, Hanson noted.

Another procedure, called real-time logging, sends information about reservations directly to the tapes after being recorded on disk. Since the information is stored on tape, in the event of disk failure the reservations system can be brought up to the point prior to the failure, Hanson noted.

A controller and one string of eight tape drives are linked to one 370/158 to handle Res-A-Vision, the airline's on-line reservation system. An electronic switching device connects that CPU to the other two CPUs and another string of eight tape drives.

Two drives from that segment of National's system provide applications data such as aircraft maintenance and crew scheduling, payroll, personnel, pension information and data on various test and development work. The other six tape drives are shared with the third CPU for batch work.

Applications software developed by National analyzes information from incoming ticket agents and picks out the critical data. That includes the number of seats booked on National flights as far as 340 days in advance, passenger names and telephone numbers, flight numbers and changes in the number of passengers in the original reservation.

National is also upgrading its disk system, Hanson said.

Installation Goes Easy for 4331

(Continued from Page 53)

signed an accession, or identification, number, and all the relevant data — such as patient name, doctor's name and type of test desired — are keyed into the 4331. The samples are then analyzed by automated systems. An interface on most of the analyzing machines enables them to record test values, connected to the accession number, on a diskette.

Periodically, the diskette is read into the 4331, where the data from the tests is matched up with the work order data. The results are then either printed on an in-house printer and delivered to the doctor's office by courier or sent electronically to terminals in the doctor's offices or hospitals.

The only doctors or hospitals with terminals are those whose volume is so high that the cost of the terminal and communications line can be justified, Murray explained.

In urgent cases, such as blood samples submitted by hospitals for a patient believed to be suffering from a drug overdose, the computer flags the work as a special case and prints off a list of "Urgent Requests Pending." This enables the lab to give the sample the attention that might mean the difference between life and death, Murray said.

When interviewed recently, Murray was guardedly optimistic about the results of his new acquisition. "It's really too early to tell if there will be a significant improvement in speed," he said, although IBM has indicated the programs should run faster with some adjustment.

School Graduates To On-Line CPU

(Continued from Page 53)

puter services.

The Honeywell system handled 50 users simultaneously during its first semester of operation. The Burroughs system could accommodate 15 users with a 5 min response time, according to Fasbinder.

In addition to its current function, Oakland University President Donald D. O'Dowd would like to see the system give DP experience to all 11,000 undergraduates attending the school. While introducing the system to academic users and converting administrative systems have taken the bulk of the past semester, university officials are making plans to expose all students to computing.

The school is now looking for funding to expand the 1M-byte system by adding more memory and two Honeywell Level 6 front ends. Thompson said the university might also have to add to its nine disk drives and five tape drives to handle administrative functions next year.

A special faculty committee to study future expansion of the system has been appointed.

'When You Serve French, German, Mongolian, Polynesian and Japanese Recipes, It Becomes Indispensable.'

Nine Vendors Judged

Users Rate Itel, DEC, Amdahl CPUs Highest

By Howard A. Karten
CW Staff

DELRAN, N.J. — General-purpose computer systems made by Amdahl Corp., Digital Equipment Corp. and Itel Corp. scored higher than equipment made by other vendors, according to a recent survey of user satisfaction conducted by Datapro Research Corp. here.

The study was conducted by mailing out 10,000 questionnaires to Datapro subscribers last October. Responses were received from 894 representing a total of 1,030 installed systems.

The study asked respondents to rate their computer vendors in each of 12 categories: ease of operation, reliability of maintenance, reliability of peripherals, responsiveness of maintenance, effectiveness of maintenance, technical support, operating systems, compilers and assemblers, applications programs, ease of programming, ease of conversion and overall satisfaction — a "bottom-line" category.

In that bottom-line category, Itel users gave their systems an average 3.5 rating, where a "1" represented poor, "2" fair, "3" good and "4" excellent. The average rating for DEC systems was 3.4 and for Amdahl systems, 3.3.

However, these three vendors were more sparsely represented than any other vendors in the survey. Only 11 respondents were Itel users, 15 were DEC users and 13 Amdahl users.

By contrast, Honeywell, Inc., with a 3.1 rating, was represented by 68 users and Control Data Corp., with a 3.1 rating, by 25 users.

Ratings Not Definitive

The report is careful to note that the ratings should not be considered definitive. "The ratings should be used as guides to potential product strengths and weaknesses that may call for further investigation in selecting the most suitable equipment for your needs," Datapro advised. "Small sample sizes make unequivocal conclusions impossible."

That computer vendors in general are doing something right can be inferred from the study, since of 108 averages (nine companies rated in 12 categories), only 29 were less than 3.0 (i.e., less than "good"). The lowest average Datapro tabulated was 2.1, or "fair."

Even in the three categories with the greatest number of less-than-good ratings — technical support, applications programs and reliability of peripherals — users tended to give all nine manufacturers lower marks rather than singling out any one individually.

In technical support, for example, Itel earned a 3.4 rating, Amdahl a 3.2 and DEC a 3.0. The other vendors — IBM, CDC, Univac, Honeywell, NCR and Burroughs Corp. — came in below 3.0.

These findings, coupled with the generally low ratings for application programs — where only Itel and Amdahl (neither of which market applications programs extensively) earned marks greater than 3.0 — may indicate areas where vendors have fairly consistently neglected customer satisfaction.

Burroughs earned four "first place" ribbons: in ease of operation, operating systems, compilers and assemblers and ease of programming. IBM earned first place only for the reliability of its peripherals.

One potentially surprising finding in the report is that some of the hardware surveyed has apparently had "a far longer life expectancy than might have been predicted in view of the rapid pace of technological innovation and the regular arrival of new families, offering ever more attractive price/performance ratios and more appealing processing facilities," Datapro said.

The IBM 360 still constitutes nearly 9% of the systems represented in the survey.

Copies of the report, "User Ratings of General-Purpose Computing Systems," are available for $15 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

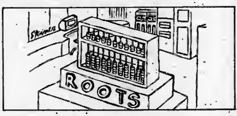
Conference to Discuss The 'Office of Tomorrow'

BOSTON — "Office of Tomorrow: New Developments and Trends in Systems, Hardware, Concepts, Applications and Markets" will be the subject of a conference to be given in Chatham, Mass., Sept. 23-26.

Among the topics to be covered will be the implications of technology on tomorrow's office; implementation planning to avoid problems in the office of the future; justifying the automated office; and advances in the integration of word and data processing.

Assisting conference chairman Samuel J. Kalow of IBM will be speakers representing users, vendors and industry watchers.

Enrollment for the conference, which costs $595 for four days (including room and board), is "limited," according to the conference organizer, the Institute for Graphic Communication, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.



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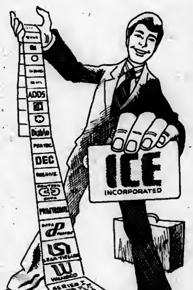

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Mainframe Keeps Up With Firm's 40% Growth

Special to CW

WESTWOOD, Mass. — It is a truism that expansions in a company's business activities must be matched by expansions in its DP power if it expects to keep growing and operating efficiently. Analog Devices, Inc. here, a manufacturer of electronic components and instrumentation systems, is a good example of that matched growth.

The company, which had sales of $66.1 million in 1978, has been experiencing a growth rate of approximately 35% to 40%, company officials indicated. As a result, it has had to upgrade its mainframe twice in the past two years.

Even though it has been using its IBM 370/148 for little over a year, Peter Selig, manager of data systems for the company, is already looking toward the company's next upgrade, which might be either an IBM 3031 or the recently announced 4341.

"We've had the 2M-byte 148 for a little over a year. Before that, we had a 138, which we also had for a little over a year. And before that, we had a 370/115," he said recently.

Work in Process

One system that has been particularly useful to the company tracks work in process, enabling the firm to know precisely where each batch of products stands in the manufacturing process.

"We've cut the wafer fabrication manufacturing cycle and new product introduction time in half, as well as reduced inventories," Forrest M. Gasik, Semiconductor Division production and inventory control manager, claimed. "Now, production control knows which products to manufacture in what quantity and time frame, and manufacturing can gauge the exact workload at each work center, as well as production levels by shift, day or week.

"We never knew the yield of manufacturing until after the entire manufacturing cycle was completed. Now we know what the impact of certain events will be when those events occur, whether one day or four weeks into the cycle. It gives us about a six-week jump on planning," he maintained.

Before turning to a computerized work-in-process system, the company tracked the production stages of its integrated circuits on giant magnetic boards that choked the hallways and production floor at its Wilmington, Mass., manufacturing site. Tiny magnets, or tags, blanketed 16-ft by 8-ft boards, which showed the status of any one of 50 products at each of 50 to 60 workstations.

"Whenever a lot moved, the tag might not move with it," Gasik recalled. "Or people brushed up against the boards and moved the tags out of place. We lacked control — no one knew where the different lots actually were, summarizing was difficult and we could not zero in easily on 'hot' products."

The work-in-process system, the first real-time application at the company, has paid for itself in the nine months it has been operating, Selig said, and its users are enthusiastic about it. "We try to get users involved from the beginning in planning a system so they know its theirs," he offered as an explanation of the success of the system.

The most common use of the system is for on-line inquiry. "Inquiries on activity by work center and by lot are used the most. On the IBM 3278 CRTs, users can display item master information, standard routings, lots on hold by part number or work center, rejected lots and work center daily production — just about anything you need to know," the DP manager said.

Control Over Inventory

"Our computer capabilities pay off in lower, more accurate inventories," Gasik added. "All scheduling, inventory and throughput figures are firm. In the past, we had about 60 lots a week that did not reconcile with physical inventory; now, that's down to three or four, which is an acceptable level. And we have reduced physical inventories to once a month."

The real payoff of the system, however, is in the marketplace, Gasik noted. "We can balance inventory to end demand and project what will happen before it happens. Last year, our Semiconductor Division introduced 25 to 30 integrated circuit products — which is the source of over 90% of our annual growth. Two factors helped us improve the market reception to those products: a shorter manufacturing cycle and improved yields.

"In the past, we had no data base to determine market demand and status of products in the manufacturing cycle. Now we do. On one of our products, for example, we were able to cut the manufacturing cycle to one-third of what it had been. That helped result in actual sales five times greater than what the marketing department had forecast."

The hardware has been of such value to the company that it now plans to extend its use to cover other manufacturing steps, such as laser wafer trimming and probing and separating good from defective circuits.

Get Info on Info in Computerworld and Computerworld

Two back-to-back Special Issues of *Computerworld* will cover INFO 79 from top to bottom.

- *October 15 Info 79 Show Issue*
- *October 22 Info 79 Wrap-up Issue*

Computerworld's one, two punch will bring all the details on Info 79 to your desk. October is the month and New York Coliseum is the place. This four-day show will feature over 200 exhibitors, 250 speakers, 80 sessions and an expected 20,000 attendance comprised of corporate executives, DP managers and administrative managers.

Computerworld will be there too, and we'll have up to the minute coverage of Info 79 in our October 15th issue and a wrap-up of what went on the four days of Info 79 in our October 22nd issue.

We also have a booth there, so if you're going, stop by #2112 for a free copy of our Show Issue. It'll outline the high points of the show—exhibitors, speakers, special events—along with a guide to night life in New York. Ad closing dates for these two special issues are shown below. If you're exhibiting, be sure to put your ad in both of these issues. Your *Computerworld* representative can give you full ad planning assistance. Or, to reserve space for your ad, call Frank Collins at 965-5800.

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To Handle 16 Terminals

Vendor Scales Down HP 3000 Series 33

PALO ALTO, Calif. — In a move that would make Detroit's automobile builders nod in approval, Hewlett-Packard Co. has introduced a scaled down, lower priced version of its HP 3000 Series 33 minicomputer.

Patterned closely after the Series 33 machine, the Series 30 offers the same CMOS Silicon-on-sapphire processor technology that keeps the CPU-related hardware reduced to two printed circuit boards. Whereas the Series 33 offers an eight-port asynchronous data communications controller that can support up to 32 terminals, however, the basic Series 30 has a four-port configuration that can handle only 16 terminal stations.

The minimum Series 30 setup is supplied with 256K bytes of main memory that can be expanded to 1M byte in the full-blown configuration. Like the Series 33, the Series 30 incorporates HP's self-diagnostics feature and the Remote System Verification Program (RSVP) that is said to improve onsite services and provide the abilfty to control the system from authorized remote consoles over dial-up telephone lines.

The HP 3000 Series 30

Using HP's MPE-III operating system, the Series 30 can run any HP 3000-oriented application program — programs migrate at the object code level — and can execute software written in Cobol, Basic, Fortran, RPG or SPL, HP's high-level systems programming language. In addition, the Series 30 has full

(Continued on Page 60)

Univac V77 Gets Diskette Storage

IRVINE, Calif. — Univac's Minicomputer Operations has introduced a diskette storage system that provides system and secondary storage for the firm's V77 minicomputers.

The storage is available as a single-drive module with a capacity of 554,400-bytes that is expandable to a dual-drive module with a capacity of 1,108,800 bytes, a spokesman said. A second rack-mountable slave unit can be added and can be expanded by a third slave for a total of four diskette drives.

The V77 user can utilize the diskette as a data disk with either the Summit or Vortex operating system. The storage system can also be used to off-load host computers in a network environment, the spokesman noted.

Scheduled for delivery this month, the single-diskette system is priced at $4,000 and the dual-drive device costs $5,500 from the firm's division at 2722 Michelson Drive, Irvine, Calif. 92664.

Award-Winning System Puts Hospital Back on Its Feet

Special to CW

DOUGLASVILLE, Ga. — Located about 20 miles west of Atlanta and surrounded by numerous lumber mills, Douglas General Hospital is an up-to-date, well-staffed medical services facility. A few years ago, however, the hospital's DP operations threatened the well-being of the entire 100-bed center.

"The situation, in a nutshell, was a mess," according to H. Lee Roper, assistant administrator and chief financial officer of the hospital. Patient files were misplaced, information was posted on the wrong sheets and out-of-date patient status reports abounded.

An outdated patient accounting system, installed when Douglas General opened in 1974, was causing administrative headaches and impacting hospital finances. While the medical center's business office was getting by with the mechanical system, the facility's handling of payroll had deteriorated to the point where an outside service bureau had to be recruited to make ends meet, Roper explained.

Fortunately, last year Douglas General decided to install an in-house Burroughs Corp. B80 small business computer system to handle the nearly 6,000 patient account files.

Tight Control

"You wouldn't recognize things around here today," Roper said. "We have been able to put patient records under the tight control we lacked with the old system and now know where we stand financially at all times."

The hospital's financial watchdog admits that the new equipment, together with Burroughs application software, has given Douglas General administrators immediate access to patient information and a better grip on its account receivables.

The Burroughs Hospital Administrative System (BHAS-II) program products were part and parcel of the ultimate decision to install a computer and have been the bases

(Continued on Page 60)

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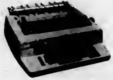

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For general purpose computing, manufacturing administration or automation in the factory and lab, HP computer products are extremely flexible and easy to use. Your departmental personnel won't have to become computer experts to operate them. Some models, for example, have special keys right on the console to guide the user step-by-step through his job. Specialized HP applications packages can give your materials manager direct control of his inventory and order planning or even let him set up a factory data collection system—without any computer experience. And HP's family of engineering and scientific computer products provides the tools you need for sophisticated computation, measurement, and testing jobs.

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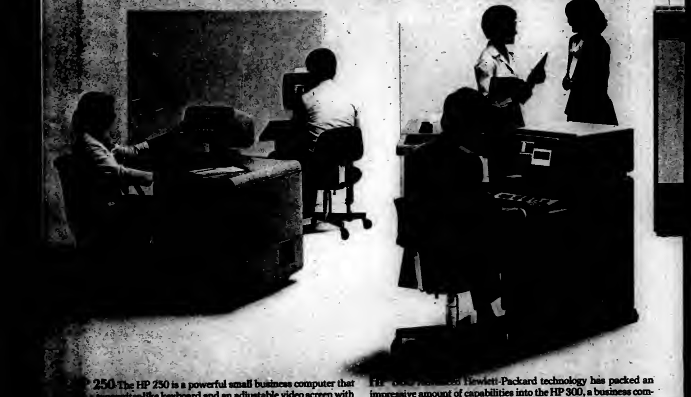

250 The HP 250 is a powerful small business computer that [illegible] typewriter-like keyboard and an adjustable video screen with [illegible] programmable "soft keys" to make the user feel right at home. [illegible] from $23,500, the HP 250 can support five local terminals [illegible] act as a terminal for the HP 3000.

HP 300 Advanced Hewlett-Packard technology has packed an impressive amount of capabilities into the HP 300, a business computer designed especially to handle specific departmental jobs like order entry, customer files or personnel records. Priced from $36,500, the HP 300 can accommodate 16 users from an innovative display console that simplifies operating and programming the system.

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HP 3000 The HP 3000 Family is Hewlett-Packard's most powerful business computer line. Both the Series III (pictured above) and the Series 33 use MPE-III, a multiprogramming operating system that facilitates on-line transaction processing at terminals throughout your company. The Series 33 (which can support up to 32 terminals) is priced from $58,500, while the Series III (64 terminals) starts at $105,000.

HP 1000 The HP 1000 Systems Family consists of five upward-compatible models (from $20,000 to $100,000) designed to meet the diverse needs of engineering and manufacturing environments. All use HP's powerful RTE operating systems, and the HP-IB interface bus lets you monitor and process data from over 200 Hewlett-Packard instruments.

System Puts Hospital Back on Its Feet

(Continued from Page 57)

for what has been accomplished to date. Minor software modifications concerning the format of the patient record were made by the machine's vendor to tailor the program to the hospital's specific needs.

Faster Billing

"Billing is one of the most important advantages of the new system," Roper explained. "We try to get inpatient billing out four days after discharge, outpatient billing the day after service and statements once a month.

"We used to drop everything to get the billing out as soon as humanly possible. Now, the computer has made it possible to generate the monthly statements in only six hours and have them in the mail that day."

Working from data that is input to the file daily, the computer automatically prints three separate types of bills. One is a summary invoice that is sent to the patient. The second is a detailed bill listing individual charges for all services the patient has received. The third is a standard medical form accepted by all insurance companies doing business in Georgia. Medicare and Medicaid forms can also be printed automatically, Roper stated.

Probably as important as the billing is the control the system affords the hospital through various reports. A key report is the patients master record, which is printed every two weeks. This is a listing of every bill in accounts receivable in detail, balanced, totaled and aged. It contains all information needed to work the accounts and answer questions.

Reams of Paper

Although the patient billing data used to generate reports was available before the computer was installed, it was contained in paper jackets, Roper noted. Not only did administrators have to locate these sometimes elusive files, but they also had to shuffle through reams of paper to answer usually simple patient queries.

Now it is simply a case of checking the computer-prepared reports or going to one of the on-line Burroughs TD/830 CRTs in the business or credit and collections office and keying in a code that displays patient information on the CRT screen.

In addition to reports dealing with patient finances, the computer also provides internal controls. Basic to the programming is a table listing all patient services and charges by department.

Other Reports

Although this data is the accounting backbone of the billing process, it is also used to provide the departments with monthly revenue reports. For example, the report for the laboratory shows how many tests were done during a certain month, as well as the dollar revenue for those tests.

"These reports provide the department heads with a control tool that was very time-consuming to work up by hand," Roper observed. "We know they use them, because they're usually clamoring for them every month before we can get them ready."

Douglas General's continuing quest for a more economical operation resulted in a first-place award from the Georgia Hospital Association in 1978 for its cost containment and cost reduction efforts. Competition was open to all hospitals in the state, regardless of size.

DG Printers Interfaced To Memory

MINNEAPOLIS — A line printer controller for Data General Corp. Nova and Eclipse minicomputers or equivalent machines has been announced by Custom Systems, Inc.

The Model 370 is a single-board controller that reportedly enables dot matrix, band or impact printers from various manufacturers to interface directly to memory.

The differing interface techniques of the printer manufacturers are accommodated within the controller by selecting appropriate jumper conditions for data and status polarity, command code decoding or inhibit an tabbing operations, the firm said.

The Model 370 is fully compatible with the instruction set and operating systems software offered by DG, the firm claimed.

HP Scales Down 3000 Series 33

(Continued from Page 57)

distributed systems network capabilities, including remote data base access, file sharing and program-to-program communications.

Software bundled with the system includes HP's Image/3000 data base management with Query, the View/3000 software that generates business forms, and Ksam/3000 keyed sequential file access method.

INP Included

The Series 30 incorporates the recently unveiled Intelligent Network Processor (INP) that reportedly enables the minicomputer to function at "congestion-freeing" speeds as great as 56K bit/sec. The INP front-end communications processor has 32K bytes of on-board random-access memory (RAM) and helps to offset the workload from the CPU, the spokesman added.

In its maximum 1M-byte configuration, the Series 30 has a disk storage capacity of 960M bytes. Four magnetic tape drives and two line printers can also be linked to the minicomputer in its fully expanded mode.

For users who desire more I/O capabilities, including the addition of more remote stations, the Series 30 can be upgraded to a Series 33.

In fact, the mid-range Series 33 is exactly the same as the full-scale Series 30, except that the 33 can accommodate up to seven more communications lines without sacrificing terminal ports.

Accompanied by a separate system maintenance console and system disk, the basic Series 30 is priced at $49,750, nearly $9,000 less than the low-end Series 33's $58,500 price tag. Expansion of the memory of the Series to 1M-byte inflates the base price by $15,000.

HP is at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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Psytek Packages Floppy-Based Business System

GLENVIEW, Calif. — Two IBM-compatible floppy disk drives, a matrix printer, a CRT and built-in self-diagnostic capabilities are all part of a small business computer package offered by Pystek, Inc.

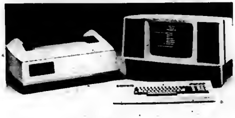
Basically a turnkey system consisting of three Intel Corp. Multibus-structured circuit board, the Psytek 770 incorporates a Z80A microprocessor and has 48K bytes of expandable random-access memory.

The system's boards include 4K bytes of read-only memory and a 4K memory area that is used for CRT activities and as a scratchpad.

The Psytek 770 can accommodate up to four single-density floppy drives, boasting a combined storage capacity of 1M characters of information. It has a seven-slot card cage that can be used for such additional expansion boards as a serial/parallel I/O board and a graphics board for black-and-white or color displays.

Software packages for the system include general ledger, accounts receivable, accounts payable, payroll, inventory management and a name and address management system.

The standard 770 package with a 160 char./sec, 132-column printer, CRT, detachable keyboard and one software program costs $9,955 from Psytek at 1900 Pickwick Ave., Glenview, Ill. 60025.



The Psytek 770

Printer Controller With DMA Built For DG Systems

SAN DIEGO, Calif. — Datasystem Corp. is offering a line printer controller with direct memory access (DMA) capabilities that interfaces with Data General Corp Nova and Eclipse minicomputers.

The DLP 2200 accesses memory directly, releasing the mainframe for problem-solving tasks, and increases the throughput of the operation, the vendor claimed.

A self-test mode sends a 96-character Ascii set to the printer to test the controller, cable and line printer.

A programmable interval timer and a long lines option are available.

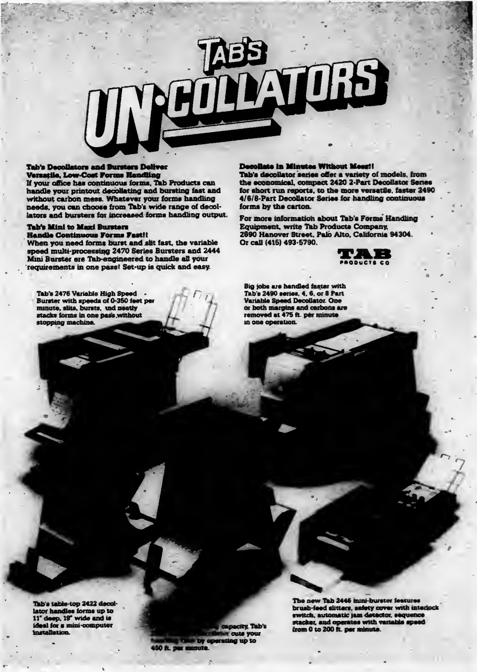
The DLP 2200 costs $1,500. The programmable interval timer option is priced at $500 and the long lioes option costs $200.

Datasystem also introduced a programmed input/output line printer controller that costs $805, it said from 8716 Production Ave., San Diego Calif. 92121.

Clarification

In the Special Report article "Tennessee Municipalities Gain DP Autonomy" [CW, Aug. 27], the author failed to mention that the University of Tennessee provided DP assistance to several nearby communities with a little help from a friend. John Scoggins of the University of Georgia, directed and trained project members throughout the effort.

'It's Our Way Way Backup System.'



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The new Tab 2446 mini-burster features brush-feed slitters, safety cover with interlock switch, automatic jam detector, sequence stacker, and operates with variable speed from 0 to 200 ft. per minute.

Mini Helps Firm Cut Inventory Fluctuations

Special to CW

DELAWARE, Ohio — A small manufacturer here reportedly can cope better with grossly fluctuating supplies of raw materials and has improved productivity since installing an in-house minicomputer and ending its dependence on a DP service bureau.

As a manufacturer of customized hydraulics equipment, Valves and Presses, Inc. cannot afford shortages of steel, castings, seals and packaging. Neither can it afford overstock situation, according to DP manager Judd Scott.

"We normally buy our raw materials anywhere from 60 to 120 days before we ship our products, and we really need to eliminate those fluctuations in our inventory," he explained. The service bureau Valves and Presses had employed for three years to run an inventory system "gave us a two-or three-month turnaround on inventory control data — which made it next to impossible for us to make sensible purchasing decisions.

"We just couldn't respond fast enough to industry shortages, price hikes or delayed deliveries; and we certainly couldn't plan enough ahead to buy our steel at the less expensive mill quantity rates," Scott added.

Bringing DP Into Family

"We decided we just had to bring DP capabilities inside so we could handle our own inventory management just like everything else in a family-owned business," the 24-year-old executive continued.

"We have 50 employees, 10 of them members of my family. My grandfather founded the company in 1937 and we've been keeping as much of the work as possible in the family ever since,"he said.

In May 1977, Scott began looking for small business system. "This was really an experience because, [although] I have a business degree, [I] knew nothing about DP and had no idea what we needed, how to find out or who could tell me.

"I began my search by writing to an office publication for information, and suddenly I was deluged with vendor literature. A DP consultant who has been working with small businesses for 12 years helped me go through this information. Together we tried to weed out those companies he had never heard of or companies so far away that we felt I wouldn't get the type of on-site help I would probably need," Scott explained.

A few months later, the field of candidate vendors was narrowed to IBM, Univac, NCR Corp., Data General Corp. and Burroughs Corp. "We made arrangements with each vendor to look at their systems in operation," Scott said. "In the case of NCR, we went to Columbus, Ohio, and actually watched our company applications run on a demo machine."

Caveat to DP Buyers

Scott has some advice for anyone else attempting such a search and evaluation process: "Don't let them snow you. If it hadn't been for the consultant who sorted through all the technical details, I'd probably be overconfigured and oversold today," he said.

"If you don't understand what the salesman is saying, ask him to explain. And, if he can't explain it to you in plain English, chances are good he'll never take the time to explain much of anything to you and you'll always be confused and uncertain,' he warned.

For his purposes, Scott foond little difference between the hardware and "most of the software" offered by the six finalist vendors except that the NCR software seemed more adaptable to Valves and Presses' anticipated growth.

"The people at NCR were at least 50% of the reason I bought an NCR system," he observed. "The salesman and analysts working with us seemed the most knowledgeable and willing to help.

"I felt the NCR salesman really went out of his way to help me understand his product," Scott continued. "That in itself makes me respect NCR. [Also,] the NCR system seemed a little easier to use, more flexible; and, since NCR was so close, I felt confident I could get help fast."

Valves and Presses received the NCR 8150 computer sytem in August 1978. The configuration included a 64K-byte processor, 10M-byte disk storage, a 70 line/min matrix printer and a 9-in. CRT terminal for maintenance and data base inquiry.

A second 10M-byte disk cabinet is reportedly on order and Scott expects to need two more CRT terminals for inquiry. The configuration is supported by such applications software as accounts payable, accounts receivable, general ledger, payroll, inventory control, product definition and order processing. Each package is designed to run independently of the others as a stand-alone application or in conjunction with any of the others.

"With the help of NCR, we spent the first two months setting up our interactive system, tailoring the software to our specific needs and determining the file size for various applications," Scott said.

"We had our inventory and payroll applications up and running by the first of December and the accounts payable and receivable were up a month later. By February, we were running general ledger and we started invoicing from our order processing system in June."

Time Investment

Scott noted that "no vendor can do all the work for a small business just getting involved in DP. You've really got to put time into the project yourself. In all, I spent two full weeks attending NCR seminars to learn how to install and run the different application software packages.

"Bringing a powerful compoter into our small but growing business has been a real boost," he concluded. "Finally we have accurate information on inventory and raw materials and we can manage our cash and stick to budgets.

"The inaccuracies inherent with our old manual system have nearly disappeared and so has the time wasted in tracking them down. We have nearly completed a product definition system that will make us more competitive and more profitable," Scott added.

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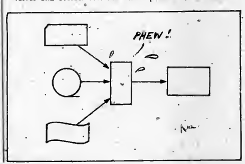

Micro Bytes

MIC Lists Suppliers Of Business Software

CHERRY HILL, N.J. – A list of suppliers offering business software for use on commercially available microcomputers has been prepared by Management Information Corp. (MIC).

In a special issue of "Packaged Software Reports," MIC provides listings containing the name of the program, the host computer it runs on, the program language and the price. Also included is a brief description of each program. In addition, the report lists the names, addresses and phone numbers of more than 50 suppliers.

The special issue is available for $10 ($20 outside the U.S and Canada) to nonsubscribers of "Packaged Software Reports." Copies are available from MIC at 140 Barclay Center, Cherry Hill, N.J. 08034.

TI Publishes Guide to Micros

DALLAS – A publication entitled "Understanding Microprocessors" is available from the Texas Instruments, Inc. Learning Center Library.

This addition to TI's Understanding Series covers varied aspects of those systems that use microprocessor chips as the central units for processing and control.

A self-teaching textbook with quizzes, a glossary and an index, the book shows what a microprocessor consists of, how it fits into the computer system, what other system parts are necessary and how the microcomputer system functions.

The book, which costs $4.95, may be ordered from TI through P.O. Box 3640, MS 84, Dallas, Texas 75285.

Book Describes 8255 Chip

INDIANAPOLIS – *Microcomputer Interfacing with the 8255 PPI Chip* by Paul F. Goldsbrough introduces the reader to the Intel Corp. 8255 Programmable Peripheral Interface (PPI).

The book, published by Howard W. Sams & Co., Inc. describes the 8255, where it fits into a microcomputer system and why and how it is used. The procedure for configuring the PPI is covered, as are the major microcomputer I/O techniques and their implementation through the use of the 8255 PPI.

The book costs $8.95 from the firm at 4300 W. 62 St., Indianapolis, Ind. 46206.

Catalog Covers Apple Software

NORTHRIDGE, Calif. – A free catalog listing software for Apple Computer, Inc. and Apple-compatible equipment has been released by Rainbow Computing, Inc., a retail store.

The catalog can be requested from Rainbow at 9719 Reseda Blvd., Northridge, Calif. 91324.

Lack of Security Technology For Micros Seen Troublesome

WASHINGTON, D.C. – The absence of security technology for anything other than large-scale or mini-based computer systems is becoming more and more troublesome as microprocessor technology is increasingly applied to systems with stringent security requirements.

In a paper presented at the recent Compcon '79 conference here, it was noted that computer security research has been devoted almost exclusively to mini and mainframe architecture. Compounding the problem is the fact that "approaches for satisfying security requirements for microprocessor-based systems have proven to be somewhat different from those for mini- and maxi-based systems," according to the paper's author, John M. Gilligan, computer systems specialist for Systems Development Corp. in McLean, Va.

Gilligan's paper described the difficulties of designing a micro-based communications system requiring multilevel security. According to his definition, "multilevel security is required when a communication system has subscribers of different access privileges who must operate with data of multiple levels of sensitivity."

Few Options

A system designer with this task before him finds himself with few options, Gilligan said. "The state of the art in computer systems security has only recently begun to offer security protection features in hardware and software capable of supporting multilevel security policies," and these features are very difficult to apply to micro-based designs.

"The hardware and software characteristics of microprocessors – and the characteristics of some microprocessor applications – have been found to exhibit attributes that limit the ability to transfer security approaches being developed for larger systems to microprocessors," he said.

In several respects, the very nature of current microprocessor architecture precludes implementation of multilevel security. Gilli-

(Continued on Page 64)

Cryptext Offers TRS-80 Users Plug-In Encryption Device

SEATTLE – Cryptext Corp. is offering Radio Shack TRS-80 users an encryption device designed to plug directly into the back of the TRS-80 or into the expansion interface via an optional cable.

The Cryptext device reportedly allows business users and hobbyists to secure almost any type of data quickly. The encrypted data can be stored on cassette tapes or on disks.

Used with a modem, Cryptext allows data or messages to be transmitted in privacy via telephone or other communications channels.

Prior to encoding, the user must enter a 10-char. key; each of the 2^{80} possible keys result in a different and incoherent version of the data submitted. In addition, a code branch feature allows Cryptext's internal code generator to modify its code sequence dynamically, resulting in more than 2^{190} possible code sequences, according to the firm.

To decode the data, four elements are essential: the encrypted data, the Cryptext unit, the software and the correct user-supplied key. The absence of any one of these elements prevents access to the original data, the vendor noted.

The unit, which is small enough to fit in a pocket or briefcase, is supplied with demonstration software and user-oriented documentation and costs less than $300. Cryptext modules for other microcomputers will be available soon from the firm at P.O. Box 425, Northgate Station, Seattle, Wash. 98125.

Vector Graphic Adds RAM Board

WESTLAKE VILLAGE, Calif. – Vector Graphic, Inc. is offering an S-100 bus programmable read-only memory/random-access memory (Prom/RAM) board featuring a Prom programming capability for creating customized software programs.

The board accommodates up to 12K bytes of 2708- or 2704-type Prom, with 1K byte of 2114 static RAM. Addressing is controlled by jumper options, and special circuitry is incorporated for the reset-and-go function and for generating Mwrite.

An on-board sliding switch allows conversion of one of the Prom sockets to a Prom-programming socket. An assembly language program that permits the transfer of data from memory to an erased Prom in the programming socket facilitates operation.

The 12K Prom/RAM board costs $215 from Vector Graphic at 31364 Via Colinas, Westlake Village, Calif. 91361.

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Eprom Programmer Debuts

CUPERTINO, Calif. Intersil, Inc. is offering users a microprocessor-controlled Cmos erasable programmable read-only memory (Eprom) programmer designed for the firm's IM87C48/C41 single-chip microcompoters and the IM6653 and IM6654 Cmos Eproms.

The programmer also has expansion capabilities for up to three additional types of Cmos Eproms provided in the hardware, the firm said.

The 6902 operates with a terminal, as a stand-alone unit or as a peripheral to a computer and features built-in RS-232C and 20mA current loop interfaces. Any one of 14 different transmission speeds from 50- to 9,600 bit/sec can be selected by a switch on the rear panel.

The microprocessor frimware contains 16 different editing, loading, listing and programming commands. Data may be loaded or dumped in Ascii, hex or BNPF formats, displayed in any on 15 number bases or used for erasable programmable read-only memory (Eprom) programming in either complementary or normal modes

Checksum generation assures data accuracy during any read, modify load, output or programming command. Cmos Eproms are checked for erasure and verified during each programming execution.

The system costs $950, and optional cables are $60 each. Intersil is at 10710 N Tantua Ave., Cupertino, Calif. 95014.

Lack of Micro Security Seen Becoming Troublesome

(Continued from Page 63)

gan noted. "Virtually all of the off-the-shelf microprocessors and microprocessor systems now available lack one or more of the hardware capabilities" — memory mapping, multiple processor execution states and instruction-trapping features — "necessary to implement protection systems" that make use of the popular "security kernel" design.

A security kernel "implements the desired policy through controlling access to shared systems resources, including data, and allocating the shared resources to isolated systems and user processing environments," Gilligan explained.

As a further design complication, this "lack of hardware protection features limits the ability to employ other design practices that have become standard in many systems development efforts," he said.

"The software characteristics of many microprocessor applications also inhibit security software development;" a "typical design goal for micro-based systems, Gilligan noted, is to trade software size and complexity for the flexibility and low cost of using multiple microprocessors for less complex and highly repetitive tasks.

Approaches do exist for developing microprocessor-based systems that can satisfy multilevel security requirements, according to Gilligan. However, because of the hardware and software limitations of microprocessors, "security design approaches tend to be application-specific and not always easily generalized for use in other applications having different functional or hardware attributes

Several Methods Proposed

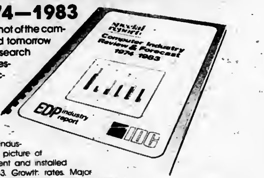
Gilligan discussed several methods for solving the security problems of micro-based systems. One effective option is to use multiple dedicated microprocessors to process individual security levels. "The flexibility and cost of microprocessor technology makes the use of dedicated processors especially attractive" he noted

"An alternate security strategy requires relatively straightforward hardware enhancements to provide hardware environments suitable for developing multilevel security enforcement schemes," he said.

"Increasingly sophisticated microprocessor hardware features such as those exhibited by some of the new 16-bit microprocessors will in the near future provide much of the hardware support necessary to develop effective software security designs for microprocessor-based systems," Gilligan said.

Additional security design options will become better suited to micro-based systems as the result of additional research to develop and adapt high-level languages to microprocessor use and as a result of the development of "an adequate set of compiler tools," he concluded.

'We're Interested in a Minicomputer. Do You Have Anything In Early American?'



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Present Ones 'Exercise in Illusion'

Looser U.S. Export Controls Urged . . .

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — U.S. export controls have failed to prevent the growth of communist military power or persuade other countries to change their behavior. Instead, the controls — by contributing to a serious decline in the U.S. domestic economy during the past several years — have "eroded our national security." A new export control law is desperately needed, now.

This is the gist of a paper presented by Sherman R. Abrahamson at Compcon 79, held here last week by the IEEE Computer Society. Currently special assistant to the chief executive of Control Data Corp., Abrahamson was formerly director of east-west trade development and deputy director of export control in the Department of Commerce.

Terming the claimed benefits of export controls "an exercise in illusion," Abrahamson said the notion that they protect the national security is based on a theory which "has been discredited thoroughly in many analytical studies . . the elemental truth of the matter is that the export control policy of the United States has had no discernible effect on the growth of military power [in] any of the communist countries."

Hundreds of export licenses have been denied to indicate U.S. dissatisfaction with the behavior of the purchasing countries, Abrahamson added, but "in not one instance can these interventions be shown to have produced the desired behavioral change."

He also attacked the widely accepted belief that export controls protect the U.S. domestic economy against shortages: "Instead of maintaining adequate supplies in the United States and retarding price increases, [controls] have severely distorted the workings of the market, encouraged traditional buyers of U.S materials and products to seek out more reliable suppliers in other countries, and diverted to foreign production capital investment that was badly needed in the United States."

Loss of $10 Billion

Citing studies based on surveys of its members by the Electronic Industries Association (EIA), Abrahamson said that losses of foreign sales attributable to U.S. export controls amounted to $10 billion in 1978. "These [lost] transactions would have provided 400,000 to 500,000 jobs for U.S. workers," he observed.

One reason for the decline of U.S. exports, Abrahamson contended, is a hidden one — "an undetermined but significantly large number of firms" manufacturing high-technology products are unwilling to export because of the red tape, delay and uncertainty imposed by the present export licensing process.

To remedy this situation, he proposed replacing the present Export Administration Act with a new law based on "an unambiguously positive export control policy" capable of convincing U.S. businesses that the government will "give long-run support" to their development of overseas markets for commercial products, services and technologies.

Such a law would remove restrictions on the items covered by the present Export Administration Act while continuing controls on military items. Abrahamson conceded that some commercial products, services and technologies covered by the export act might jeopardize U.S. security if sold to certain countries, but he argued that other statutes give the President sufficient power to close this loophole.

Conceivably, commercial products sold in peacetime could add to a potential enemy's war-making power, but Abrahamson maintained that making the potential adversary "as dependent as possible on the United States" is better strategy than restricting sales of such products. "The more an opponent is dependent upon us, the more vulnerable his economy, especially his military-industrial base, is to damage from economic warfare at a time when it really counts — that is, shortly before and during war," he explained.

. . . But Would They Really Make Any Difference to Communists?

By Bohdan O. Szuprowicz
Special to CW

Normalization of relations between the U.S and China and the initial signing of the Salt agreements at the Vienna summit conference are undoubtedly responsible for the latest resurgence of the perennial debate over exports of Western computers to communist countries.

President Carter's recent choice of IBM's former board chairman Thomas J. Watson, as U.S. ambassador to Moscow added a new flavor to the issue, which has been simmering without interruption since the Cold War.

In the heat of discussions about the merits and dangers of selling advanced technology to potential adversaries and competitors, the latest computer developments in the Soviet Bloc and China went unnoticed or unreported. Politics have been playing havoc with DP trade with the East, while the geopolitical and technoeconomic realities of the situation are seldom understood.

Promoters of increased trade with communist countries continue to deplore the apparent loss of huge potential markets as a result of excessive export controls. For the last 10 years they have been oblivious to the fact that these countries

(Continued on Page 68)

HP Creates New Umbrella To Cover All Computer Groups

By Jeffry Beeler
CW West Coast Bureau

PALO ALTO, Calif. — Hewlett-Packard Co. has undergone a reorganization that brought all the company's computer operations together into a single group.

Aimed at increasing management efficiency, the reorganization calls for HP's Desktop Computer Division to leave the Calculator Products section and join the firm's Computer Systems Group, which has been renamed the Computer Groups.

Like the Computer Systems organization, the newly formed Computer Groups embraces HP's General Systems Division and its Data Terminals Division, according to a company spokesman. Unlike the organization it replaces, however, the Computer Groups also embraces three other operations — the Computer Marketing Groups, the Technical Computer Group and the Computer Peripheral Group, all of which are new creations.

To direct the activities of these infant organizations, HP has appointed three of its executives as general managers. Douglas C. Chance, former marketing manager of the Computer Systems Group, will head the Technical Computer Group; Richard A. Hackborn, the Computer Peripheral Group; and James L. Arthur, Computer Marketing

(Continued on Page 66)

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HP Creates New Umbrella To Cover Computer Groups

(Continued from Page 65)

Group.

Arthur, former general manager of the Data Terminals Division, has relinquished his previous position to Robert E. Watson, who formerly headed the Calculator Products Group. Edward R. McCracken, meanwhile, will retain his post as general manager of the General Systems Division.

All five group general managers will report to the newly appointed Computer Groups chief, Paul C. Ely Jr., who formerly headed the now-defunct Computer Systems Group.

Group Eliminated

In another facet of its reorganization, HP also eliminated its Calculator Products Group, which consisted of the Desktop Computer Division and the Corvallis Division.

Because its products perform mostly scientific and engineering applications, the Desktop Computer Division will become part of the Technical Computer Group.

The Corvallis Division, which supplies hand-held calculators, will report to HP Executive Vice-President Ralph E. Lee.

Ending Duplication

HP's reorganization represents an attempt to eliminate the duplication of effort that arose within the company when its Desktop Computer Division began straddling the boundary between the Calculator Products and Computer Systems Groups, the spokesman explained.

When the Desktop Computer operation first went into business several years ago, its products offered only modest performance compared with the rest of HP's systems line, and hardly anyone questioned the appropriateness of including the division in the Calculator Products Group.

But as hardware technology rapidly improved, the firm's desktop "calculators" became increasingly indistinguishable in performance from the minicomputer systems manufactured by the Computer Systems Group.

Despite this narrowing technological gap, HP continued to treat its desktop and minicomputer systems operations as two unrelated entities, with separate sales and hardware development staffs, the source said.

Now, by transferring the Desktop Computer Division from the Calculator Products Group to the Computer Groups, HP once again consolidated both sides of its business and in so doing removed the wasteful overlap between the two.

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SEE PAGE 23

STSC Earnings Take a Dive

BETHESDA, Md. — Scientific Time Sharing Corp. (STSC) reported a 23% increase in revenues but a 17% decrease in earnings for its latest fiscal year.

STSC President Daniel Dyer attributed the losses to a substantial increase in the company's effective tax rate associated with the nondeductibility of its European losses. The company's European expansion was more expensive than anticipated, Dyer conceded, but said it was well worth the investment.

For fiscal 1979, STSC's revenues totaled $16.6 million compared with $13.5 million last year.

Earnings were $980 million or 61 cents per share, down from the $1.1 million or 81 cents per share reported last year.

Dyer estimated that about half of the revenues gain came from increased use of the company's services by current users.

The company recently announced the signing of a five-year contract with Telco Research Corp. of Nashville, Tenn.

The pact is for the joint development and marketing of software products to optimize voice and data telecommunications networks.

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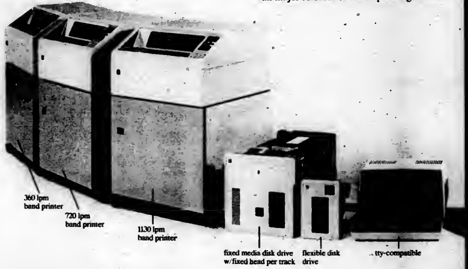

Viewdata Tests Abroad to Make Waves in U.S.

NEW YORK – Overseas experiments with Viewdata have shown four significant trends that could shift the pattern of development for Viewdata services in the U.S. according to a recently completed study.

Those trends are the increasing use of in-house Viewdata systems by business, the emergence of private Viewdata services, the move by computer equipment suppliers to exploit the in-house and private Viewdata markets and the French postal, telephone and telegraph (PTT) administration s private directory concept.

Developed by the British Post Office, Viewdata is a communications system that gives home and business users an interactive means of accessing a large number of data bases using Touch-Tone telephones and an ordinary TV set.

The survey, conducted by Link Resources Corp. in conjunction with Butler Cox & Partners, Ltd., found that many British business firms such as Whitbread, Ltd., a large beverage firm, are installing in-house Viewdata systems that use dedicated minicomputers.

These systems, however, use TVs instead of conventional terminal systems. Users have found this type of system easier and less expensive to use because of the standard interface between TVs and Prestel (Prestel is the British name for Viewdata).

The second trend was an increasing acceptance of private Viewdata networks. VNU, a Dutch publishing group, is the first commercial business to operate a private Viewdata network. That service will be an expansion of a service offering access to career data.

Both the in-house and private Viewdata experiments now underway in Europe have sparked marketing opportunities for several computer equipment vendors

For example Britain's General Electric Co. plans to market terminals, editing systems and minicomputers through its Private Viewdata Systems Division.

International Computers, Ltd. (ICL) and Thorn TV Rental have formed a partnership to produce a Viewdata system called Thorntel which will interface Thorn terminals with ICL processors. In addition, IBM Holland has designated a coordinator to evaluate Viewdata.

Electronic Directory

The fourth development which holds promise for a long-range worldwide impact is the move by the French PTT to implement its electronic directory concept.

Recently the PTT announced plans to run an experiment which allows users to access addresses and phone numbers sorted on a special computer The terminals used with the system will be distributed free, the cost of the service will be recovered from printing and maintenance cost savings

Currently in the U.S. two Viewdata experiments are either planned or under way Last month AT&T began testing its possible forerunner to Viewdata, the Electronic Information Service (EIS). The test involves 75 to 100 residential and business customers [CW Sept. 3].

In addition, Knight-Ridder Newspapers Inc is planning a 150-family Viewdata experiment next April

The study Videotex and Its Potential Impact in Europe is available for $12 000 from Link at 215 Park Ave S. New York, N Y 10003

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Looser Export Controls Don't Matter in East

(Continued from Page 65)

elected long ago to become self-sufficient in computer hardware and made no secret about it.

Those in the West who oppose exports of computers and other high-technology products believe that such equipment could be diverted for military purposes or for repressive use by local police forces. These arguments are laughable in the face of reality.

The Soviet Union alone is now credited with nuclear overkill capability, as anyone who has followed the Salt negotiations is well aware. At this late hour, even a dozen of the most powerful American computers would hardly make any difference at all in the balance of power.

As for repressing the citizenry, those countries were doing a splendid job of it even in the pencil and paper era. The motto of their police forces has always been, "Give us the man, and we'll tell you all the laws he has broken."

Meanwhile, the Soviet Union, Eastern Europe and even China are busy developing their own computer industries to meet most of their demand, keep foreign competition out and hopefully perhaps even get a foothold in Third World countries.

An export director of Robotron in East Germany recently revealed that his company has an agreement with Control Data Corp. under which Riad EC-1040 computers exported to Third World countries can be equipped with CDC peripherals.

Western exports of computers and office equipment to the whole Soviet Bloc from 20 different countries peaked in 1975 at about $197 million. The Bloc represents less than 7% of the global installed value of DP equipment, and only a small percentage of that amounts to the Western market share.

In 1978, IBM exported a paltry $18 million worth of DP equipment to all communist countries, a figure that represents less than .1% of the company's revenues — hardly a market share worth talking about.

The U.S. Department of Commerce stopped sponsoring DP trade shows in the East as early as 1976, and individual corporate participation in Eastern trade shows has slackened off.

At the Leipzig Trade Fair last March and at the Hannover Trade Fair in April, the Soviet Bloc countries began announcing their Riad 2 systems, which consist of more than 150 different DP products. These range from the large EC-1065 Soviet number-cruncher, claimed to be capable of speeds up to 5 million operations per second, to a choice of microprocessors and business machines, of which Robotron of East Germany is becoming a leading manufacturer.

During June, the Soviets staged a large Riad 2 equipment exhibition in Moscow in which only Comecon countries participated. The latest Riad 2 equipment was introduced to large numbers of Soviet Bloc end users.

This show was hardly even mentioned outside the Soviet Bloc. Western manufacturers are clearly excluded from the most important Soviet Bloc DP events.

The French Connection

What have been in the news are the Soviet-French and Sino-French DP agreements under which CII-Honeywell Bull and other French equipment manufacturers are to help the Soviets and China develop their respective computer industries.

Considering the fact that French DP technology is not at the very cutting edge of the industry, the latest cooperation announcements appear to have all the earmarks of continuing Bloc attempts to liberalize export controls of the Western world and not to offer it a larger share of its DP markets.

Fair Share at Stake

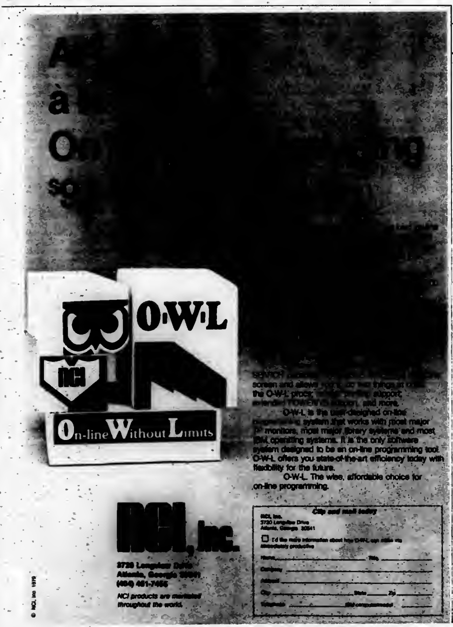
Nevertheless, there is little question that export controls and end-user installation licensing is a hindrance to free trade and that a streamlining of the procedures is in order. But the real objective of protecting the market shares of high-technology manufacturers must be clearly kept in sight.

On the other hand, a clear-cut limit must be drawn on exports of DP manufacturing technology and equipment beyond which no licenses would be granted until a fair share has been acquired by the owners of each advanced technology or equivalent payment in hard currencies received for transfer of licenses with clear limitations on marketing rights.

While the government should minimize its regulation of high-technology trade, for which it is remarkably ill-equipped, the manufacturers should not expect it to underwrite their financial risks in transactions with the East, either. We all know that communist countries observe their financial obligations scrupulously, but whether many of these are really profitable to Western manufacturers is another matter altogether.

The Soviet Bloc is self-sufficient and rich in mineral resources such as oil and strategic materials that the West must import. Rather than financing sales to the East with Western loans, payment should be demanded in these scarce and valuable commodities.

The chances are that when the communist countries are confronted with all these trade realities, the present DP trade levels will hardly change at all and we will not have to speculate about their intentions and markets any more.



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Cady Gets DEC Marketing Post

MAYNARD, Mass. — Roger C. Cady has been appointed director of marketing for Digital Equipment Corp's Commercial Systems Group.

In his new position, Cady will be responsible for the group's strategic business evaluation and product planning.

Cady joined DEC in 1967. In 1969 he was named manager of Small Computer Engineering and subsequently became engineering manager for the development of DEC's PDP-11 family. He is considered the co-inventor of the PDP-11 Unibus architecture.

Executive Corner

Other Moves

- J. Kevin Reger has been elected to the board of directors of Auerbach Corp. for Science and Technology.
- John F. Knopf has been named vice-president of finance at Market Compilation Research Bureau, Inc.
- Elmer I. Clegg has been named director of the Minicomputer Marketing Organization for Honeywell, Inc.
- Justus F. Lowe Jr. has been named president of Softech, Inc.
- Michael T. Smith has been named corporate vice-president of operations for Infoton, Inc.
- Robert J. Ridge has been named vice-president of research at Billings Computer Corp.
- George Breed has been named director of sales planning and control for Data General Co.'s North America sales organization.
- Lloyd D. Kendall, Molly A. Wolfe, and Ronald L. York have been named division vice-presidents and general managers within Informatics, Inc.'s Information Services Group.
- Paul E. Jones Jr. has been named president of Gaylord Library Systems and vice-president of Gaylord Bros., Inc.
- Lewis R. Shomer has been named Computer Systems Division vice-president of end-user sales at Pertec Computer Corp.
- James R. Oyler has been named vice-president of marketing at Harris Corp.'s computer Systems Division.
- William S. Cook has been named manager of market planning and corporate marketing for Memorex Corp.
- Robert B. Cox has been named vice-president of engineering at Threshold Technology, Inc.
- M. Lloyd Bond has been named vice-president of marketing and Alfred Dolbey has been named vice-president of sales for T-Bar, Inc.
- Paul La Voie has been named vice-president of marketing at Zentec Corp.

Vargo Forms Consulting Firm

ROCHESTER, Mich. — Michael K. Vargo, formerly executive vice-president of CMI Corp., a third-party IBM equipment vendor, has started his own consulting service.

The newly formed firm, One PM Co., will offer users, vendors and lessors assistance in equipment selection and in evaluating marketing strategies for the IBM third-party market. That market is the largest used capital asset market in the world, Vargo claimed.

Vargo worked with CMI for the past six years, but recently resigned, claiming he had a difference of opinion with the other owners over the future direction of the firm.

Vargo said he is in the process of selling out his equity interest to the remaining partners.

Earnings Reports

TYMSHARE
Three Months Ended June 30

	1979	1978
Shr Ernd	$.76	$.58
Revenue	48,130,000	36,605,000
Earnings	3,602,000	2,647,000
6 Mo Shr	1.78	1.33
Revenue	98,815,000	74,681,000
Earnings	8,352,000	6,008,000

COMSHARE
Year Ended June 30

	a1979	1978
bShr Ernd	$1.42	$1.26
Revenue	52,980,400	25,639,100
Earnings	4,732,400	3,413,300
aExtr Credit	358,000	831,000
b3 Mo Shr	.32	.36
Tax Cred		c159,000
Revenue	16,659,200	7,320,200
Earnings	1,204,000	971,000

a-Reflects increase in interest in Comshare International to 100% from 45% as of Nov 1, 1978. b-Adjusted for a three-for-two stock split payable in August 1979. c-Tax-loss carryforward

APPLIED DATA RESEARCH
Three Months Ended June 30

	1979	1979
Shr Ernd	$.01	$.22
Revenue	6,729,126	4,801,054
Earnings	9,232	306,564
6 Mo Shr	.07	.51
Revenue	12,997,803	9,351,696
Earnings	91,734	705,036

ELECTRONIC MEMORIES & MAGNETIC
Three Months Ended June 30

	1979	1978
Shr Ernd	$.01	$.17
Revenue	36,673,000	31,985,000
Earnings	b302,000	1,201,000
6 Mo Shr	c.	.28
Revenue	73,135,000	62,654,000
Earnings	b410.00	2,074,000

a-Restated. b-Includes gain of $347,000 in the quarter and $856,000 in the six months from sale of investments. c-No share earnings shown, preferred dividend requirements exceeded net income. The company is in arrears on its preferred stock dividends.

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The Kodak IMT-150 microimage terminal can increase dramatically the productivity level around your office or department.

How? The IMT-150 terminal has its own intelligence—an inboard microprocessor capable of performing its own information lookups. In seconds. At the touch of a button. Without help from your mainframe.

It follows then that, if the IMT-150 terminal itself is more productive, the people who operate it will be, too. They can find needed data quicker and easier, resulting in more lookups per hour/day.

In fact, in one test in the adjustment department of a multi-branch department store, a productivity increase of more than 50% has been recorded.

The IMT-150 terminal is productive in other ways, too. For example, it helps lower your operating costs, because storage of data on microfilm is much cheaper than on-line magnetic storage in a computer. Also, operating errors are practically eliminated, because the IMT-150 terminal relies on the intelligence of its programmable microprocessor to do all the hard work.

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Eastman Kodak Company, 1979

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Skill in COBOL Programming language.

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Skill in COBOL programming language.

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*UNIX is a trademark of Bell Laboratories

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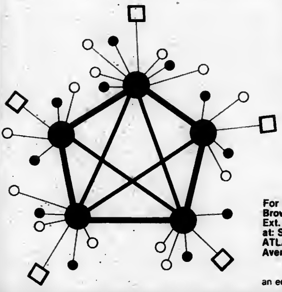
SYSTEM ENGINEERS will participate in the specification of system architecture and translation of requirements into software specifications. Considerations include data transmission, network maintenance and management, centralized billing and improved customer service. You will also participate on task teams with other GTE organizations to develop requirements and specifications, and to prepare design and implementation plans. Qualifications should include in-depth experience in communications system engineering. Telephony background is desirable. BS/MS in Engineering or Computer Science.



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For further Information call Fred Brown collect at (617) 890-9200 Ext. 621 or send a resume to him at: SYLVANIA SYSTEMS GROUP, ATLANTIC OPERATION, 100 First Avenue, Waltham, MA 02154.

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Educational requirements include a Bachelors or Masters Degree in Computer Science or Engineering depending upon the particular graphics project being considered. Experience with Control Data equipment and FORTRAN is preferred. Experience in computer graphics, mini computers, CAD/CAM, or structural engineering is also desirable.

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- **— Automated Component Placement**
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- — Applications/Programmer Analysts with experience in PC board routing programs
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• • •

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Assist timesharing users in planning and developing management science applications. Minimum 3 years experience, 1 year of which is in time sharing techniques using DBMS; financial modeling and forecasting tools, knowledge of FORTRAN. Previous timesharing experience and a degree in management science or business is required.

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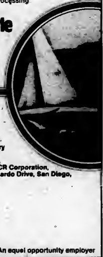

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SYSTEMS PROGRAMMERS

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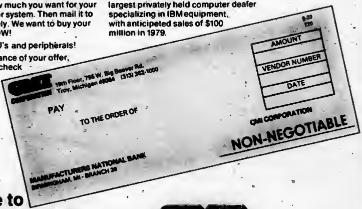

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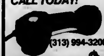

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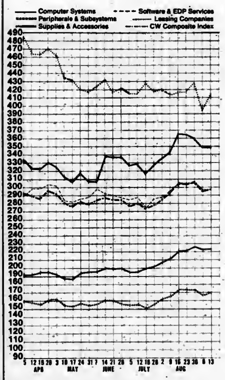

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Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, SEPTEMBER 11, 1979

All statistics compiled,
computed and formatted
by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE SEP 11 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	23- 69	22 7/8	-1 5/8	-6.0
N	BURROUGHS CORP	59- 87	71 1/4	-1 1/2	-2.0
O	COMPUTER AUTOMATION	11- 44	11 1/2	- 1/2	-4.1
N	CONTROL DATA CORP	23- 49	45 3/8	+ 3/4	+1.6
O	CRAY RESEARCH INC	8- 39	34 1/2	+2 1/2	+7.8
N	DATA GENERAL CORP	42- 74	66 1/8	- 7/8	-1.3
N	DATAPOINT CORP	34- 88	84 3/4	+1 1/2	+1.8
N	DIGITAL EQUIPMENT	39- 65	61 3/8	- 1/8	-0.2
N	ELECTRONIC ASSOC.	2- 13	7 1/2	0	0.0
A	ELECTRONIC ENGINEER.	9- 19	14 1/4	+ 1/4	+1.7
N	FOUR-PHASE SYSTEMS	19- 48	35	+ 3/4	+2.1
N	FOXBORO	28- 44	40 1/8	- 1/8	-0.3
O	GENERAL AUTOMATION	1- 28	14 1/4	- 1/8	-0.8
O	GRI COMPUTER CORP.	1- 3	1	0	0.0
N	HEWLETT-PACKARD CO	24- 57	53 3/4	- 3/4	-1.3
N	HONEYWELL INC	63- 82	78 1/4	0	0.0
N	IBM	67-321	66 1/2	-1 3/4	-2.5
O	MANAGEMENT ASSIST	9- 29	22	+ 1/4	+1.1
O	MANUFACTURING DATA S	9- 33	31 1/4	- 1/4	-0.7
O	MICRODATA CORP	10- 32	31 3/4	+ 3/4	+2.4
O	MINI-COMPUTER SYST	4- 8	3 3/4	- 1/4	-6.2
O	MODULAR COMPUTER SYS	7- 18	12 7/8	+ 1/4	+1.9
N	NCR	57- 81	75 1/4	- 5/8	-0.8
N	PRIME COMPUTER INC	9- 22	17 5/8	+ 3/8	+2.1
N	PERKIN-ELMER	17- 36	29 1/4	+ 1/2	+1.7
N	SPERRY RAND	33- 52	48 5/8	- 5/8	-1.2
A	SYSTEMS ENG. LABS	11- 24	13	0	0.0
O	TANDEM COMPUTERS INC	13- 37	32 1/4	+1 1/2	+4.8
A	WANG LABS.	8- 25	23	+ 3/8	+1.6

LEASING COMPANIES

EXCH		1978-79 RANGE (1)	CLOSE SEP 11 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COURIER CORP	13- 21	17	- 1/2	-2.8
O	COMDISCO INC	3- 21	15 3/4	+1 3/4	+12.5
A	COMMERCE GROUP CORP	1- 1	1/2	+ 1/8	+33.3
A	COMPUTER INVSTRS GRP	1- 7	3 3/8	+ 1/4	+8.0
O	CONTINENTAL INFO SYS	4- 15	3 1/2	0	0.0
N	DATRONIC RENTAL	1- 4	2 7/8	0	0.0
A	DCL INC	3- 5	5 1/4	0	0.0
N	DPF INC	8- 14	10 3/8	- 1/4	-2.4
N	ITEL	4- 36	9 1/4	- 1/4	-2.6
N	LEASCO CORP	24- 52	51 7/8	+4 5/8	+9.7
O	LEASPAC CORP	1- 4	1/2	0	0.0
A	PIONEER TEX CORP	3- 7	2 3/4	0	0.0
N	U.S. LEASING	13- 20	18 3/4	+ 1/8	+0.7

EXCH: N=NEW YORK A=AMERICAN B=PHIL-BALT-WASH
L=NATIONAL M=MIDWEST O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1978-79 RANGE (1)	CLOSE SEP 11 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/4	0	0.0
O	ANACOMP INC	4- 22	14 3/4	- 1/4	-1.6
A	APPLIED DATA RES.	8- 17	10 3/8	0	0.0
N	AUTOMATIC DATA PROC	26- 37	35 1/4	+ 1/8	+0.3
O	COMPU-SERV NETWORK	5- 19	14	+1 3/4	+14.2
O	COMPUTER HORIZONS	1- 9	3	- 1/4	-7.0
O	COMPUTER NETWORK	5- 18	5 7/8	- 1/8	-2.0
N	COMPUTER SCIENCES	8- 17	15 5/8	0	0.0
O	COMPUTER TASK GROUP	1- 7	6 1/2	0	0.0
O	COMPUTER USAGE	2- 4	2 3/8	- 1/8	-5.0
O	COMPUT AUTO REP SVC	4- 10	6 1/2	- 1/4	-3.7
O	COMSHARE	6- 26	18 1/2	+ 1/4	+1.5
O	CULLINANE CORP	14- 33	23 1/2	- 1/4	-1.0
O	DATA DIMENSIONS INC	2- 9	2 1/8	+ 1/8	+6.2
O	DATATAB	1- 4	2 3/8	0	0.0
N	ELECTRONIC DATA SYS.	15- 28	24	-1	-4.0
O	INSYTE CORP	1- 3	3 5/8	+ 1/8	+0.3
O	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 8	5 1/8	0	0.0
O	KEYDATA CORP	1- 4	4	- 1/8	-3.0
A	LOGICON	10- 19	15 3/4	- 1/4	-1.5
O	NATIONAL DATA CORP	1- 18	14 1/8	- 1/2	-3.4
A	ON LINE SYSTEMS INC	12- 30	26 5/8	+ 3/4	+3.1
N	PLANNING RESEARCH	4- 10	7	+ 1/8	+1.8
O	PROGRAMMING & SYS	1- 1	1	- 1/8	-11.1
O	RAPIDATA INC	3- 7	6 1/8	+ 1/8	+3.1
O	REYNOLDS & REYNOLD	16- 36	30 1/2	+ 1/4	+0.8
O	SCIENTIFIC COMPUTERS	3- 9	7 3/4	- 1/8	-1.5
N	TYMSHARE INC	18- 44	43	+2	+4.8
A	URS SYSTEMS	5- 8	8 3/4	- 1/8	-1.0
N	WYLY CORP	1- 7	8 3/8	+ 1/4	+4.0

PERIPHERALS & SUBSYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE SEP 11 1979	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	13- 32	17 3/8	+ 1/8	+1.4
N	AMPEX CORP	10- 19	17 3/4	+ 1/2	+2.8
O	ANDERSON JACOBSON	5- 12	11 1/4	+ 5/8	+5.8
N	APPLIED DIG DATA SYS	8- 22	9 1/8	0	0.0
O	BEEHIVE INT'L	3- 7	5 1/4	0	0.0
A	BOLT,BERANEK & NEW	6- 15	13 5/8	+ 3/8	+2.8
N	BUNKER-RAMO	10- 29	24 3/4	- 1/8	-0.5
A	CALCOMP	3- 13	12 1/8	- 1/8	-1.0
O	CAMBRIDGE MEMORIES	2- 8	2 1/4	0	0.0
N	CENTRONICS DATA COMP	16- 54	50 3/4	+2	+4.1
O	COGNITRONICS	1- 4	2 5/8	+ 1/4	+10.5
O	COMPUTER COMMUN.	6- 10	8 1/4	+ 1/8	+1.5
O	COMPUTER CONSOLES	4- 18	13	- 1/2	-3.7
A	COMPUTER EQUIPMENT	3- 8	5 1/8	- 1/8	-2.3
O	COMPUTER TRANSCEIVER	1- 5	4	0	0.0
O	COMPUTERVISION CORP	5- 35	32 3/4	+1 3/8	+4.3
N	CONRAC CORP	13- 26	16 3/8	- 3/8	-2.2
A	DATA ACCESS SYSTEMS	8- 10	8 1/8	+ 1/2	+6.5
B	DATA PRODUCTS CORP	13- 25	17 1/2	- 1/4	-1.4
O	DATUM INC	2- 8	2 3/8	0	0.0
O	DECISION DATA COMPUT	2- 8	4 1/4	0	0.0
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
A	DOCUMATION INC	8- 34	22 1/2	- 1/2	-2.1
O	DATARAM CORP	6- 32	22	-1 1/2	-6.3
N	ELECTRONIC M & M	3- 9	3 3/4	- 1/8	-3.2
O	FABRI-TEK	1- 2	1/8	+ 1/8	+18.8
O	GENERAL COMPUTER SYS	1- 3	2 1/2	0	0.0
O	GENERAL DATACOMM IND	9- 21	18 1/2	- 1/4	-1.4
N	HAZELTINE CORP	10- 18	18 1/4	+ 5/8	+4.0
N	HARRIS CORP	17- 36	30 1/2	+ 1/4	+0.8
O	INFOREX INC	4- 11	6 3/4	+ 1/8	+2.1
O	INFORMATION INTL INC	7- 12	8 1/2	0	0.0
O	INFOTON	1- 3	2 7/8	0	0.0
O	INTEL CORP	26- 58	51 1/2	+4 1/4	+7.9
O	INTERSIL	7- 19	18 3/4	+2 1/2	+15.3
A	LUNDY ELECTRONICS	4- 8	7	+ 1/2	+7.0
O	MSI DATA CORP	7- 19	7 1/2	0	0.0
N	MEMOREX	24- 59	26 1/4	-3 1/8	-11.4
N	MOHAWK DATA SCI	6- 15	12 5/8	+ 3/8	+3.0
O	OMEX	2- 8	7	+ 1/2	+7.8
O	PARADYNE CORP	9- 21	21 3/8	+2 3/8	+12.5
O	PENRIL CORP	5- 12	10 3/8	- 1/8	-1.1
N	PERTEC CORP	8- 17	11 7/8	- 1/8	-1.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RECOGNITION EQUIP	6- 13	7 1/8	+ 1/4	+3.6
O	SCAN DATA	1- 5	1 7/8	+	+3.4
N	STORAGE TECHNOLOGY	15- 49	17 3/8	-1 5/8	-8.5
O	T BAR INC	11- 23	22 1/2	- 1/4	-1.0
O	TALLY CORP.	6- 14	12 3/4	0	0.0
A	TEC INC	6- 13	8 1/4	- 1/4	-2.9
N	TEKTRONIX INC	44- 59	57 1/2	+1 3/4	+3.1
N	TELEX	3- 9	6 5/8	- 3/8	-7.5
O	TESDATA SYSTEMS CP	4- 20	11 1/4	0	0.0
O	WILTEK INC	1- 2	1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1978-79 RANGE (1)	CLOSE SEP 11 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	8- 12	10 1/2	+ 1/2	+5.0
O	BALTIMORE BUS FORMS	1- 4	3/4	0	0.0
N	BARRY WRIGHT	14- 36	28 3/8	- 5/8	-2.1
O	CYBERMATICS INC	1- 1	1	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	27 1/2	- 1/2	-1.7
N	ENNIS BUS. FORMS	9- 21	19	+1	+5.5
N	3M COMPANY	43- 66	53	-1 3/4	-3.1
O	MOORE CORP LTD	26- 38	37	+ 1/4	+0.7
N	NASHUA CORP	18- 31	30 1/4	0	0.0
O	STANDARD REGISTER	20- 24	21 1/4	0	0.0
A	TAB PRODUCTS CO	8- 19	17 3/4	+1 1/8	+6.7
A	WABASH MAGNETICS	10- 22	15 1/2	- 3/8	-2.3
N	WALLACE BUS FORMS	14- 33	26 5/8	+ 1/8	+0.4

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